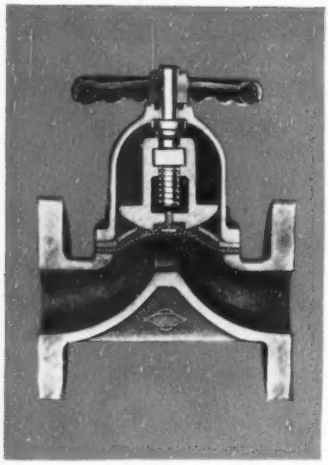
NATIONAL EDITION

Food Industries

For those who control quality and costs through management and production—a McGraw-Hill publication

Frosted cakes are wrapped in cellophane and labeled by machine at Kroger—an example of Packaging Progress, page 61.

APRIL, 1950: What's new in food packaging, Cheapest way to cool, Camera reveals waste motion, Cheese sliced from sheets, Robot X-ray grader



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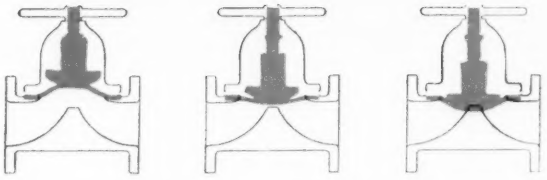
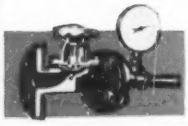


Check these popular features of

GRINNELL-SAUNDERS DIAPHRAGM VALVES



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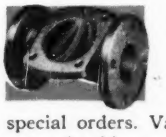

Diaphragm, body and lining materials to meet particular conditions . . . Bodies stocked in cast iron, malleable iron, stainless steel, bronze and aluminum: other materials on special orders. Valve bodies lined with lead, glass, natural rubber or neoprene. Diaphragm materials of natural rubber or synthetics. Working pressure, 150 lbs.; maximum temperature, 180°F.

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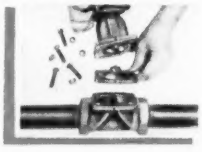

Write today for the new Grinnell-Saunders Diaphragm Valve Catalog 4-S.

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TO MAKE IT HANDY—Products and literature in this issue are listed on these pages. Those in the equipment, catalogs, and new package departments are directly below. Advertised products are listed in columns next to postcards on next sheet. Advertisements are indexed, too, starting on following page.

NUMBERS EXPLAINED—Following each product listed is number of page on which it appears, and you will find this number on the postcard for convenient circling. Letters, as A, B, C, after items on an editorial page, designate specific items on that page. Letters following advertising page numbers give positions of the ads on the pages—T means top; B, bottom; R, right; L, left; TR, top right; etc.

OTHER REQUEST, OR COMMENT—Below the numbers on the cards is space where you may put in a question or comment pertaining to anything in the issue.

USE PAGE KEY NO.

USE PAGE KEY NO.

NEW EQUIPMENT

Centrifuge 95A
Cleaner, filter 91A
Coding machine 98F
Conveyor, portable 92C
Cooker, applesauce 90A
Cooler, spray fan 94A
Exchanger, heat 94B
Hoist, chain-type 96B
Incinerator, gas-fired 98B
Light, ultra-violet 98D
Mixer, batch 91B
Motor, gear-head 94C
Motor 96A
Packaging machine 98A
Pump, centrifugal 92D
Purger, air 98E
Resins, ion exchange 90B
Separator, electronic 91C
Shovel, fork truck 98C
Switch, float 92A
Tractor, towing 92B

NEW PRODUCTS

Bag, drawstring film 112A
Basket, plastic 108B
Bread, five fruit 108D
Candy, talking box 114B
Chinese dinner 111C
Cocoa, finely milled 112B
Coffee, high-vacuum 111D
Jelly, quince 114A
Juice, frozen prune 108C
Labels, 2-in-1 color 111A
Tape, reinforcing 111B
Turkey, ready-to-eat 108A

CATALOGS, BULLETINS

Bottles, one-way 162H
Boilers, steam 158B
Centrifuges 157T
Coatings, protective 160K
Condensers 157E
Controls, flame 160D
Control, moisture 160F
Coolers 157E
Coolers 158A
Coolers, electric 158A
Conveyors, electric 158A
Conveyors, sectional 158G
Counters, heavy duty 162D
Demineralizers 162B
Detector, leak 160A
Dispenser, chlorine 160B
Dryers, electric 158A
Dust collectors 162A
Ejectors 157E
Evaporators 157O
Fillers 158L
Fillers, tube 158F
Films, transparent 160I
Filters 160C
Filters, dust 157B
Filters, pressure leaf 157I
Flavors 160G
Flotation 157K
Generators 157L
Generators, selection 157D
Heaters, hot water 157V
Hydrogen, peroxide 162G
Hydrogen, zeolites 162J
Ice making plants.....157N
Materials handling 158H
Materials handling 158I
Meat packing equip. 157R
Mixers 157S
Motors 157H
Movies, plant 162C
Oils, essential 160G
Packings 162K
Packaging units 157U
Paint, aluminum 160H
Pallets, steel 158E
Power distribution 157A
Premium promotion 162F
Pumps, centrifugal 157G
Pumps, high-vacuum 157F
Pumps, sewage 157Q
Reducers, speed 157M
Refrigeration machine 157C
Resins, vinyl butyral 162E
Safety equipment 162I
Tables, packaging 158A
Table, portable elev. 158D
Tanks, multi-process 158C
Tubes, capillary 160E
Tubing, steel 157J
Tubing, plastic 160J
Tunnel, freezing 158J
Uncaser, bottle 158K
Washer, bottle 157P
Washer-loader, bottle 158K

READER SERVICE POSTCARD

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EDITORIAL ITEMS

90A	94C	108A	114A	157I	157S	158			
90B	95A	108B	114B	157J	157T	158L			
91A	96A	108C	157A	157K	157U	158I			
91B	96B	108D	157B	157L	157V	158J			
91C	98A	111A	157C	157M	158A	158K	160E	160K	162F
92A	98B	111B	157D	157N	158B	158L	160F	162A	162G
92B	98C	111C	157E	157O	158C	160A	160G	162B	162H
92C	98D	111D	157F	157P	158D	160B	160H	162C	162I
92D	98E	112A	157G	157Q	158E	160C	160I	162D	162J
94A	98F	112B	157H	157R	158F	160D	160J	162E	162K
94B									

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92A	98B	111B	157D	157N	158B	158L	160F	162A	162G
92B	98C	111C	157E	157O	158C	160A	160G	162B	162H
92C	98D	111D	157F	157P	158D	160B	160H	162C	162I
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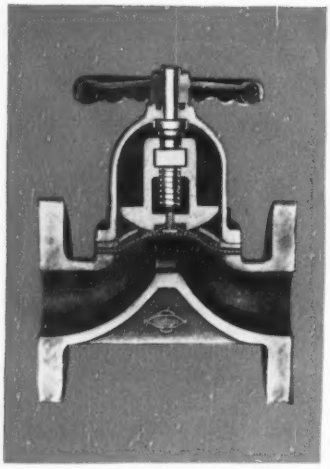

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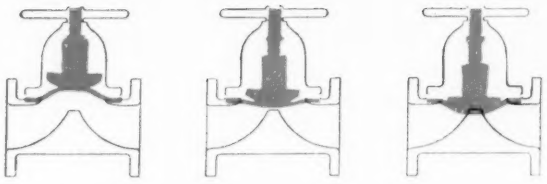

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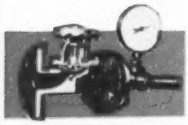

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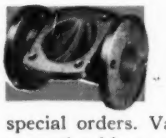

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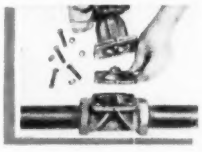

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ADVERTISERS INDEX

	PAGE
Air Express Div. Rwy. Exp. Agcy.	98
Ajax Flexible Coupling Co., Inc.	104
Allegheny Ludlum Steel Corp.	106B
Allis-Chalmers Mfg. Co.	4
Aluminum Co. of America	155
Aluminum Cooking Utensil Co.	197
American Can Co.	225
American Gas Association	156
American Pulley Co.	199
Amerio Mfg. Co.	216BL
Ames Iron Works	222R
Anchor Hocking Glass Corp.	18, 19
Armstrong Cork Co.	109
Bauer Bros.	138B
Bemis Bro. Bag Co.	123, 214
Berlin Chapman Co.	220
Betner, Benjamin C., Co.	198
Bin-Dicator Co.	228
Bristol Co.	203
Brown Instrument Div., Minneapolis Honeywell Regulator Co.	15
Buffalo Weaving & Belting Co.	134
Buschman Conveyors	153
Cambridge Wire Cloth Co.	111
Canning Machinery Div.	202
Century Electric Co.	13
Chevrolet Motor Div., General Motors Corp.	125
Chain Belt Co.	137
Cherry-Burrell Corp.	34
Chester-Jensen Co.	224
Chisholm-Moore Hoist Corp.	131
Chisholm-Ryder Co., Inc.	124
Clark Equipment Co., Industrial Truck Div.	158
Colson Corporation	140B
Container Corp. of America	151
Continental Can Co.	152
Crane Co.	105
Crown Can Co.	126
Crown Cork & Seal Co.	137
Crucible Steel Co. of Amer.	189
Cyclone Fence Co.	160B
Darnell Corp. Ltd.	119
Detecto Scales Inc.	162T
DeLaval Separator Co.	188
Distillation Products, Inc.	27, 97
Dodge & Olcott Inc.	175
Dow Chemical Co.	136, 207
Downington Iron Works	114
du Pont de Nemours & Co. Inc. E. I.	14
Eaton Mfg. Co.	106A
Electric Auto-Lite Co.	160T
Electric Storage Battery Co.	20
Entoletler Div., Safety Car & Lighting Co., Inc.	171
Exact Weightscale Co.	154
Ferguson, J. L., Co.	33
Firmenich & Co.	115
Food Machinery & Chemical Corp.	202
Foxboro Co.	166
Frick Co.	96
Fuller Brush Co.	143
Gair, Robt., Co., Inc.	190-191
Gaylord Container Corp.	Third Cover
General Amer. Transp. Corp.	10
General Biochemicals, Inc.	228
General Electric	28-29
Glycerine Producers Assoc.	31
Gottscho, Adolph Inc.	216TL
Greiner, Emil Co.	220R
Griffith Laboratories Inc.	12
Grinnell Co., Inc.	Second Cover
Hamilton Copper & Brass Wks., Inc.	94
Hapman-Conveyors, Inc.	133B
Hoffman-LaRoche, Inc.	116
Howell Electric Motors Co.	177
Hudson-Sharp Machine Co.	230
Huron Milling Co.	165BL
Hyster Co.	107
Industrial Marking Equipment Co.	179L
Ingersoll-Rand	149
Inland Steel Container Co.	173
International Harvester Co.	209
Island Equipment Corp.	179T
Jamison Cold Storage Door Co.	213
Jenkins Bros.	159
Jiffy Mfg. Co.	174B
Kinetic Chemical, Inc.	14
King Zeero Co.	218
Kohnstamm & Co. Inc.	98A
Koven & Bros. Inc., L. O.	201
LaPorte Mat. & Mfg. Co.	146B
Lee Metal Products Co., Inc.	150T
Link-Belt Co.	6, 17
Lukens Steel Co.	143
Lunkenheimer Co.	141
Mack Truck Inc.	24
Magnus, Mabee & Reynard, Inc.	205
Manheim Mfg. & Belting Co.	98B
Marley Co.	227
Master Electric Co.	181
McGraw-Hill Book Co.	165, 170, 178
Mears Kane Ofeldt, Inc.	162B
Merck & Co., Inc.	192
Mixing Equipment Co., Inc.	99
Modesto Refrigerating Co.	179BR
Monarch Mfg. Works, Inc.	216R
Monsanto Chemical Co.	25
MRM Co.	218BL
Nash Engineering Co.	89
Nashua Gummed & Coated Paper Co.	184
National Adhesives	121
National Can Corp.	221
National Technical Laboratories	16
Nicholson Co., W. H.	138T
Nordia Essential Oil & Chemical Co., Inc.	168
Nutritional Research Assoc.	228
Oakite Products, Inc.	176
Ohio Injector Co.	110

Turn to last page

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90A	94C	108A	114A	157I	157S	158		
90B	95A	108B	114B	157J	157T	158L		
91A	96A	108C	157A	157K	157U	158I		
91B	96B	108D	157B	157L	157V	158J		
91C	98A	111A	157C	157M	158A	158K	160E	160K	162F
92A	98B	111B	157D	157N	158B	158L	160F	162A	162G
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92D	98E	112A	157G	157Q	158E	160C	160I	162D	162J
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ADVERTISEMENTS

2	26	99	121	139	154	169	186	205	220R
4	27	104	122	140T	155	171	187	207	221
6	28	105	122AB	140B	156	172	188	208	222L
10	29	106	123	141	157T	173	189	209	222R
12	30	106A	124	142	157B	174T	190	211	223
13	31	106B	125	143	158	174B	191	212	224R
14	32	107	126	144	159	175	192	213	224L
15	33	109	130	146T	160T	176	193	214	225
16	34	110	131	146B	160B	177	194	215	226
17	89	111	132	147	161	179T	195	216TL	227
18	93	112	133T	148T	162T	179B	196	216BL	228
19	94	113	133B	148B	162B	179L	197	216R	229
20	95	114	134	149	163	180	198	217	230
21	96	115	135	150T	164	181	199	218T	234
22	97	116	136	150B	165B	182	200	218BL	235
23	98	118	137	151	166	183	201	218BR	236
24	98A	119	138T	152	167	184	202	219	
25	98B	120	138B	153	168	185	203	220L	

OTHER REQUEST, OR COMMENT .....

.....

.....

Name ..... Position .....

Company .....

Address .....

Card Expires July 10, 1950

ADVERTISERS INDEX

	PAGE
Air Express Div. Rwy. Exp. Agcy.	98
Ajax Flexible Coupling Co., Inc.	104
Allegheny Ludlum Steel Corp.	106B
Allis-Chalmers Mfg. Co.	4
Aluminum Co. of America	155
Aluminum Cooking Utensil Co.	197
American Can Co.	225
American Gas Association	156
American Pulley Co.	199
Amerio Mfg. Co.	216BL
Ames Iron Works	222R
Anchor Hocking Glass Corp.	18, 19
Armstrong Cork Co.	109
Bauer Bros.	138B
Bemis Bro. Bag Co.	123, 214
Berlin Chapman Co.	220
Betner, Benjamin C., Co.	198
Bin-Dicator Co.	228
Bristol Co.	203
Brown Instrument Div., Minneapolis Honeywell Regulator Co.	15
Buffalo Weaving & Belting Co.	134
Buschman Conveyors	153
Cambridge Wire Cloth Co.	111
Canning Machinery Div.	202
Century Electric Co.	13
Chevrolet Motor Div., General Motors Corp.	125
Chain Belt Co.	137
Cherry-Burrell Corp.	34
Chester-Jensen Co.	224
Chisholm-Moore Hoist Corp.	131
Chisholm-Ryder Co., Inc.	124
Clark Equipment Co., Industrial Truck Div.	188
Colson Corporation	140B
Container Corp. of America	151
Continental Can Co.	152
Crane Co.	105
Crown Can Co.	126
Crown Cork & Seal Co.	127
Crucible Steel Co. of Amer.	189
Cyclone Fence Co.	160B
Darnell Corp. Ltd.	119
Detecto Scales Inc.	162T
DeLaval Separator Co.	188
Distillation Products, Inc.	27, 97
Dodge & Olcott Inc.	175
Dow Chemical Co.	136, 207
Downington Iron Works	114
du Pont de Nemours & Co. Inc. E. I.	14
Eaton Mfg. Co.	106A
Electric Auto-Lite Co.	160T
Electric Storage Battery Co.	20
Entoletter Div., Safety Car & Lighting Co., Inc.	171
Exact Weightscale Co.	154
Ferguson, J. L., Co.	33
Firmenich & Co.	115
Food Machinery & Chemical Corp.	202
Foxboro Co.	166
Frick Co.	96
Fuller Brush Co.	143
Gair, Robt., Co., Inc.	190-191
Gaylord Container Corp.	Third Cover
General Amer. Transp. Corp.	10
General Biochemicals, Inc.	228
General Electric	28-29
Glycerine Producers Assoc.	31
Gottscho, Adolph Inc.	216TL
Greiner, Emil Co.	220R
Griffith Laboratories Inc.	12
Grinnell Co., Inc.	Second Cover
Hamilton Copper & Brass Wks., Inc.	94
Hapman-Conveyors, Inc.	133B
Hoffman-LaRoche, Inc.	116
Howell Electric Motors Co.	177
Hudson-Sharp Machine Co.	230
Huron Milling Co.	165BL
Hyster Co.	107
Industrial Marking Equipment Co.	179L
Ingersoll-Rand	149
Inland Steel Container Co.	173
International Harvester Co.	209
Inland Equipment Corp.	179T
Jamison Cold Storage Door Co.	213
Jenkins Bros.	159
Jiffy Mfg. Co.	174B
Kinetic Chemical, Inc.	14
King Zeero Co.	218
Kohnstamm & Co. Inc.	95A
Koven & Bros. Inc., L. O.	201
LaPorte Mat. & Mfg. Co.	146B
Lee Metal Products Co., Inc.	150T
Link-Belt Co.	6, 17
Lukens Steel Co.	143
Lunkenheimer Co.	141
Mack Truck Inc.	24
Magnus, Mabee & Reynard, Inc.	205
Manheim Mfg. & Belting Co.	93B
Marley Co.	227
Master Electric Co.	181
McGraw-Hill Book Co.	165, 170, 178
Mears Kane Ofeldt, Inc.	162B
Merck & Co., Inc.	192
Mixing Equipment Co., Inc.	99
Modesto Refrigerating Co.	179BR
Monarch Mfg. Works, Inc.	216R
Monsanto Chemical Co.	25
MRM Co.	218BL
Nash Engineering Co.	89
Nashua Gummed & Coated Paper Co.	184
National Adhesives	121
National Can Corp.	221
National Technical Laboratories	16
Nicholson Co., W. H.	138T
Norda Essential Oil & Chemical Co., Inc.	168
Nutritional Research Assoc.	228
Oakite Products, Inc.	176
Ohio Injector Co.	110

Turn to last page

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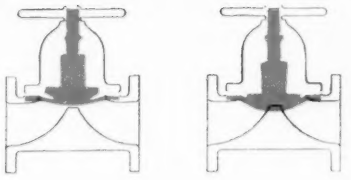

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PRODUCTS ADVERTISED

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USE PAGE KEY NO. ∨

Adhesives, for laminating....121
Air express service....98
Axles, truck, 2 speed....106A

Bags
  Self-shaping....123
  Waterproof, laminated....214
Bags & bag closers....193
Batteries, electric, storage....20
Belting
  Conveyor, flexible steel....146B
  Conveyor, plastic-coated....134
  Conveyor, wire....111, 160B
Belts, V....4, 98B
Boilers, steam....162B
Brushes, scrub....143

Caps, service, paper....148T
Carton formers, continuous....95
Cartons, folding....208
Cartons & containers 151, 152, 180, 190-191, 225, 226
Casters & wheels....119
Centrifugals, controlled discharge 144
Centrifugal separators, continuous 188
Chain, conveyor, metal....137
Chain (roller), and sprockets....17
Chemicals
  Ascorbic acid....116
  Glycerine....31
  Emulsifiers....132
  Enzymes....139
  Monoglycerides, distilled....27
  Monosodium glutamate....165L, 185
  Pesticides & herbicides....25
  Tricalcium phosphate....130
  Vitamins....192
  Vitamins, oil-soluble....97
Chlorinators....135
Ceaning units, hot spray....176
Closures, metal....187
Code imprinting machines..179BL, 216TL
Cold storage doors....213
Cold storage & freezing...133T, 179BR
Compressors
  A/C, hermetically sealed....32
  Fluid piston....89
Conveyors
  Belt, utility....148B
  Bulk materials....6, 104, 215
  Feeders & dischargers....133B
  Overhead cable....153
  Pneumatic....120
Containers
  Glass....18-19, 109
  Steel....173
Controllers
  Air operated....203
  Temperature, humidity....21
Coolers, product....218T
Cranes & hoists....112
Cutters, dry ice, electric....174

Disintegrators, vertical type....118
Drives, adjustable-speed....28-29
Dryers
  Continuous & batch....224R
  Rotary....10
Dumpers, bulk materials....150T

Fabricators
  Process equipment....201
  Tank & towers....157T
Feeders & classifiers....212
Fillers, can....124
Filling machines, liquid....218BL
Film
  Packaging, cellophane....229
  Packaging, Saran....207
Filters, plate....146T
Flavors
  Cherry....168
  Fruit....196
  Raspberry....115
  Soluble pepper....12
  Spice oils....175, 205
Flavors & colors....98A
Flavors & ingredients....200
Flow meters....164
Freezers, plate contact....216BL

Gas, for heat processing....156

Hair guards....228
Heat Exchangers....114, 186
Heaters, steam injection....150B
Hoists, electric....131

Infestation killer, continuous....171
Instruments
  Control....15
  Control, indicating & recording 211
  Indicating & recording....166

Kettles, aluminum....197
Kettles & mixers....94

Labels, heat seal, paper....184
Liners, container, plastic....182-183
Lubricants
  Refrigeration oils....236
  Special industrial....193

Mills, attrition....138B
Mixers, portable....99
Motors & power assemblies....181
Motors
  Electric....122AB
  Explosion-proof....177
  Sanitary, water-proof....23
  Splash-proof....13

Nozzles, spray....216R, 218BR

Packaging
  Design & printing....163
  Design & tech. service....221
Packaging machines
  Bag, continuous....169
  General line....30
  Pneumatic....113
  For powdered products....33
  Weighing & filling....167
  Wrappers....220
Packaging materials
  Aluminum foil....155
  Paper....223
  Vegetable parchment....93
Paint....106
Pipe, steel, Saran-lined....136
Plymetals....142
Pressure cookers, continuous....202
Processing equipment, general...220R
Pulverizers....157B
Pumps, tubing & fittings....226

Refrigerants, "Freon"....14
Refrigeration & A/C equipment...96

Scales
  Automatic, electronic....154
  Precision....162T
Speed reducers....217
Speed reducers, shaft-mounted....199
Spray containers....126
Sprectrophotometers, laboratory....16
Steam generators, packaged type 219, 222L
Steam traps....138T, 222R
Steel
  Carbon, alloy & stainless....140T
  Stainless....106B, 161, 189, 194-195
Strainers, pipe....172
Sugar, cane & beet....26

Thermometers, indicating, recording....160T
Towers, cooling....227
Trucks
  Commercial....24, 125, 209
  Hand, drum & platform....140B
  Industrial....107
Trucks & tractors, industrial....158
Tubing
  Stainless steel....123
  Valves & fittings....22, 24

Unscramblers....179T

Vacuum equipment
  Jet....234
  Steam....149
Valves
  Diaphragm....2
  Gate....110
  Gate, iron-body....141
  Globe, plug-type....159
  Lubricated plug....147
Valves & fitting....105
Vats, vacuum process....224L
Viscosimeter, electrical....220L

READER SERVICE POSTCARD

EDITORIAL ITEMS No. 11224

90A	94C	108A	114A	157I	157S	158			
90B	95A	108B	114B	157J	157T	158L			
91A	96A	108C	157A	157K	157U	158I			
91B	96B	108D	157B	157L	157V	158J			
91C	98A	111A	157C	157M	158A	158K	160E	160K	162F
92A	98B	111B	157D	157N	158B	158L	160F	162A	162G
92B	98C	111C	157E	157O	158C	160A	160G	162B	162H
92C	98D	111D	157F	157P	158D	160B	160H	162C	162I
92D	98E	112A	157G	157Q	158E	160C	160I	162D	162J
94A	98F	112B	157H	157R	158F	160D	160J	162E	162K
94B									

ADVERTISEMENTS

2	26	99	121	139	154	169	186	205	220R
4	27	104	122	140T	155	171	187	207	221
6	28	105	122AB	140B	156	172	188	208	222L
10	29	106	123	141	157T	173	189	209	222R
12	30	106A	124	142	157B	174T	190	211	223
13	31	106B	125	143	158	174B	191	212	224R
14	32	107	126	144	159	175	192	213	224L
15	33	109	130	146T	160T	176	193	214	225
16	34	110	131	146B	160B	177	194	215	226
17	89	111	132	147	161	179T	195	216TL	227
18	93	112	133T	148T	162T	179B	196	216BL	228
19	94	113	133B	148B	162B	179L	197	216R	229
20	95	114	134	149	163	180	198	217	230
21	96	115	135	150T	164	181	199	218T	234
22	97	116	136	150B	165B	182	200	218BL	235
23	98	118	137	151	166	183	201	218BR	236
24	98A	119	138T	152	167	184	202	219	
25	98B	120	138B	153	168	185	203	220L	

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90A	94C	108A	114A	157I	157S	158			
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91A	96A	108C	157A	157K	157U	158I			
91B	96B	108D	157B	157L	157V	158J			
91C	98A	111A	157C	157M	158A	158K	160E	160K	162F
92A	98B	111B	157D	157N	158B	158L	160F	162A	162G
92B	98C	111C	157E	157O	158C	160A	160G	162B	162H
92C	98D	111D	157F	157P	158D	160B	160H	162C	162I
92D	98E	112A	157G	157Q	158E	160C	160I	162D	162J
94A	98F	112B	157H	157R	158F	160D	160J	162E	162K
94B									

ADVERTISEMENTS

2	26	99	121	139	154	169	186	205	220R
4	27	104	122	140T	155	171	187	207	221
6	28	105	122AB	140B	156	172	188	208	222L
10	29	106	123	141	157T	173	189	209	222R
12	30	106A	124	142	157B	174T	190	211	223
13	31	106B	125	143	158	174B	191	212	224R
14	32	107	126	144	159	175	192	213	224L
15	33	109	130	146T	160T	176	193	214	225
16	34	110	131	146B	160B	177	194	215	226
17	89	111	132	147	161	179T	195	216TL	227
18	93	112	133T	148T	162T	179B	196	216BL	228
19	94	113	133B	148B	162B	179L	197	216R	229
20	95	114	134	149	163	180	198	217	230
21	96	115	135	150T	164	181	199	218T	234
22	97	116	136	150B	165B	182	200	218BL	235
23	98	118	137	151	166	183	201	218BR	236
24	98A	119	138T	152	167	184	202	219	
25	98B	120	138B	153	168	185	203	220L	

OTHER REQUEST, OR COMMENT .....

.....

.....

Name ..... Position .....

Company .....

Address .....

Card Expires July 10, 1950

ADVERTISERS INDEX (Continued from 2nd page)

	PAGE
Package Machy. Co.	95
Paperlynen Co.	143T
Paterson Parchment Paper Co.	93
Pick Mfg. Co.	150B
Philadelphia Gear Work Inc.	217
Pneumatic Scale Corp. Ltd.	113
Powers Regulator Co.	21
Preferred Utilities Mfg. Corp.	219
Quaker City Cold Storage	232
Regal Mfg. Co.	228
Republic Steel Corp.	194-195
Riegel Paper Corp.	223
Rietz Mfg. Co.	118
Ritchie, W. C. & Co.	208
Rohm & Haas Co.	139
Ross Heater & Mfg. Co., Inc.	188
Ryerson & Son, JT.	140T
Santa Fe Tank & Tower Co.	157T
Saran Lined Pipe Co.	136
Sarco Co., Inc.	222L
Schutte & Koerting Co.	164
Schutz-O'Neill Co.	157B
Sharples Corp.	144
Shepard Niles Crane & Hoist Corp.	112
Sparkler Mfg. Co.	146T
Spraying Systems Co.	218BR
Sprout, Waldron & Co.	120
Staley, A. E., Mfg. Co.	185
Standard Conveyor Co.	148B
Standard Oil Co.	193
Standard Steel Corp.	224L
Stokes & Smith Co.	30
Stephens-Adamson Mfg. Co.	215
Sterwin Chemicals Inc.	200
Sugar Information Inc.	26
Sylvania Div., Amer. Viscose Corp.	229
Syntron Co.	212
Taylor Instrument Co.	211
Texas Co.	Back Cover
Thomsen & Sons L. C.	226
Topflight Tape Co.	226
Transparent Wrap Machine Corp.	169
Traver Corp.	163
Trent Tube Co.	122
Tri-Clover Machine Co.	22
United Board & Carton Corp.	180
U. S. Cold Storage	133T
U. S. Electrical Motors, Inc.	122AB
U. S. Gutta Percha Paint Co.	106
U. S. Steel	160B, 161
Van Ameringen-Haebler, Inc.	196
Victor Chemical Works	130, 132
Viking Pump Co.	174T
Viaking Corp.	182-183
Wallace & Tiernan Co., Inc.	135
Walworth Co.	147
Westinghouse Electric Corp.	23, 32
Wheeler Mfg. Co., C. H.	234
Wright Machinery Co.	167
Yarnall-Waring Co.	172

SEARCHLIGHT SECTION (Classified Advertising)

INGREDIENTS FOR THE FOOD PROCESSOR	228
PROFESSIONAL SERVICE	226
STORAGE, FROZEN FOODS	232
EMPLOYMENT	
Positions Vacant	230
Selling Opportunities Offered	230
Positions Wanted	230, 231
Employment Services	230
EDUCATIONAL	
Schools	231
BUSINESS OPPORTUNITIES	
Offered	231
PROPERTY	
For Sale	231
Wanted	231
EQUIPMENT (Used or Surplus New)	
For Sale	231-233
WANTED	
Equipment	231, 232
Miscellaneous	231

ADVERTISERS INDEX

Allied Equipment Corp.	232
Bakers' Food Products Co.	232
Bonded Scale & Machine Co.	233
Brill Equipment Co.	232
Buckeye Cooperage Co.	232
Buxton, W. V.	231
Chemical & Process Machy. Corp.	232
Consolidated Products Co., Inc.	232, 233
Cott Beverage Corp.	232
Drake Personnel, Inc.	230
Equipment Clearing House	233
First Machinery Corp.	233
Fruitcrest Corp.	232
Gelb Sons, Inc., R.	233
Hershey Creamery Co.	232
Kehoe Machinery Corp., Lester	233
Loeb Equipment Supply Co.	232
Machinery & Equipment Corp., The	233
Miami School for Processing Specialists	231
Perry Equipment Corp.	233
Pierner's Bakery, Inc., The	232
Savage Bros., Co.	233
Tomsett Associates	230
Union Standard Equipment Co.	231
United Dairy Machinery Corp.	232, 233
Wright Co., Inc., R. G.	232

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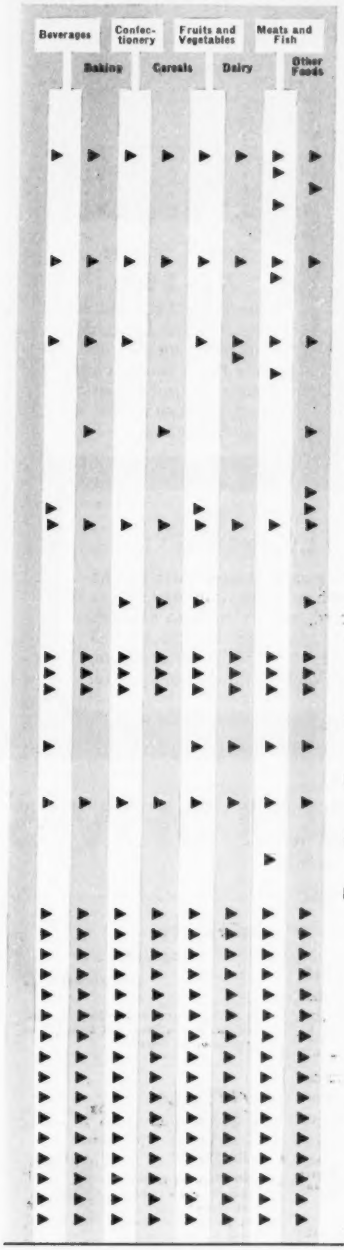
INDUSTRY INDEX



Food Industries

APRIL, 1950 • VOL. 22, NO. 4

SPECIAL FEATURES

Packaging Opportunities Challenge Food Processors.....F. K. Lawler 35
Meats For The Military: 3 Ways We Can Help.Bertram W. Gardiner, Jr. 53
Mexico Now Boasts "Ultra" Food Plant..... 77
Hot Dog—It's Tuna..... 84

MANAGEMENT

Time-Motion Improvements Come Faster With Films....Gerald Nadler 36
Service Means Profit—If.....John V. Ziemba 78

ENGINEERING

You Can Cool It Cheaper With D. A......H. G. Mojonnier 38
Cheese Formed, Cut, Packed Continuously.....F. I. Staff 42
They Engineered a Better Canned Salmon.....Ralph M. Berglund 44

SANITATION

Sure-Fire Guide for Spotting Plant Pests, II.....J. V. Blankmeyer 47

QUALITY CONTROL

This 10-Test Plan Clinched Tapioca Quality.....C. W. Kaufman 49
Hard Water Costs the Bottler Plenty.....Michael Sivetz 58
It's a Chemical, True Enough—But Foods Are Better With It
Roy E. Morse and Theodore W. Schilb 81

EQUIPMENT

Big Saving With New X-Ray Fruit Grader.....James Joseph 56

PACKAGING PROGRESS REPORT

Significant Trends, Technics, Materials..... 61
New Packages..... 66
New Packaging Machines..... 69

RESEARCH

How to Test Your Air-Blast Freezer.....E. Lowe *et al* 73

DISTRIBUTION

Borrowed Light Lends Safety After Dark..... 82

FI PICTURE-FLOWSHEET

Mechanized Salmon-Canning Operation..... 100

EVERY MONTH

Highlights—*At-a-glance roundup of things outstanding*..... 5
Talk of the Industry—*Topics of conversation among food men*..... 7
Hors d'Oeuvres—*Quips that make pertinent points*..... 7
FI Index and Outlook—*Production trends for 14 basic products*..... 8
What Washington Thinks—*Interpretive comments from the Capital*.... 11
Editorials—*Opinions and comments on current problems*.....35 and 85
Practical Ideas—*Devices and methods that can be put to work*..... 87
Food Equipment News—*Machines to cut costs, boost output*..... 90
New Packages and Products—*Innovations in foods and containers*..... 108
New Technology—*Advances reported in technical abstracts*..... 117
Food Industry News—*Roundup of recent developments*..... 127
Changes in Food Supplies—*Data on output, materials storage*..... 143
Men, Jobs and Companies—*A spotlight on firms and personalities*..... 145
Books—*What's new for the food plant bookshelf*..... 153
Catalogs and Bulletins—*Literature on equipment and supplies*..... 157
Patents—*New machines and processes developed by inventors*..... 165

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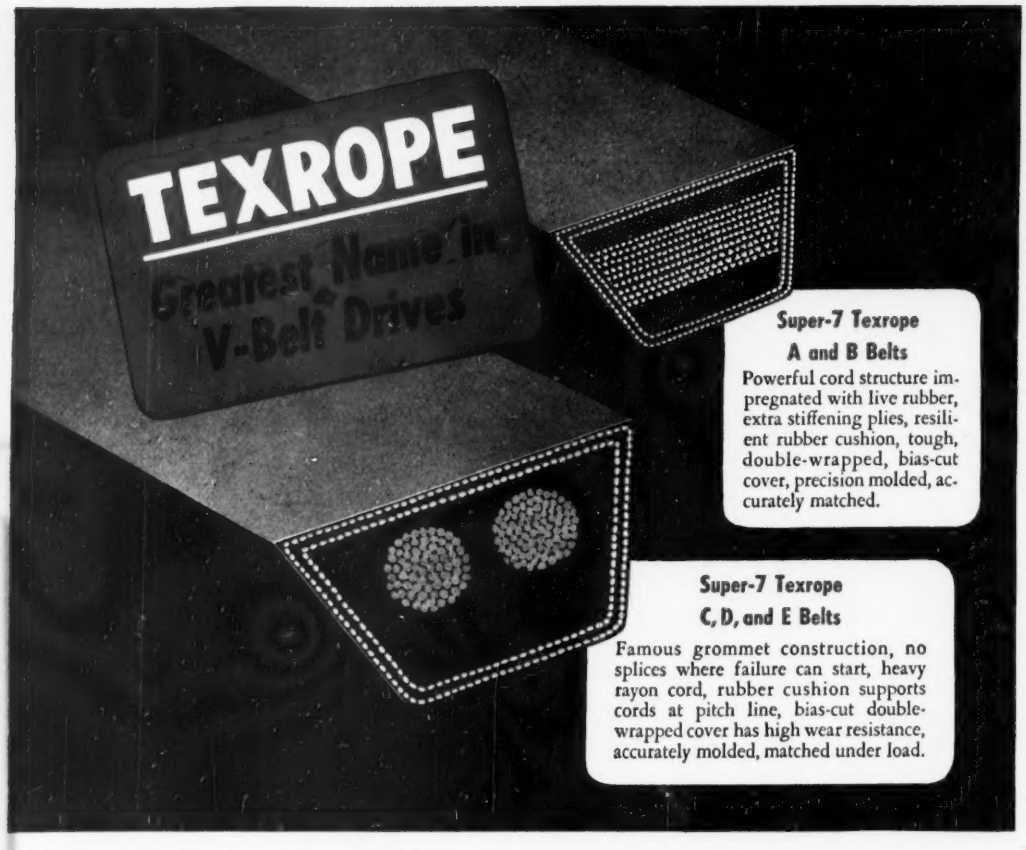

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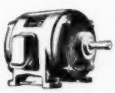

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HIGHLIGHTS

Savings on dairy products and oleo—up to 50 percent of the cost of forming, wrapping and printing—are promised by the newly developed Vogt system. Butter, ice cream, cheese and margarine are molded in any prescribed shape, packaged in precision measured units, heat sealed and printed. Also accurately wraps fractional unit at no increase in cost. Inventor C. W. Vogt says system could mean at least $10,000,000 to the industry by reducing over-weight. His ingenuity has paid off in previous developments.

Oranges are automatically sorted into seven grades — according to juice content—by a new X-ray fruit sorter, which works three times as fast as manually operated machine with about one-sixth as much labor. Could even be used to tell canners and freezers something they want to know. (See article.)

Soft drinks in beer-type cans represent latest attempt at "no deposit, no return" merchandising. As a trial in several New York suburban areas, Pepsi-Cola is packing three 12-oz., crown-top cans in handy carry-home package. Beer in cans seemed unusual, too, but it caught on.

Pre-sliced packaged cheese has been added to Kraft's output. Forming the material into sheets, chilling and machine-slicing into squares, the process also prevents sticking of slices even after exposure to softening temperature and pressure. (See article.)

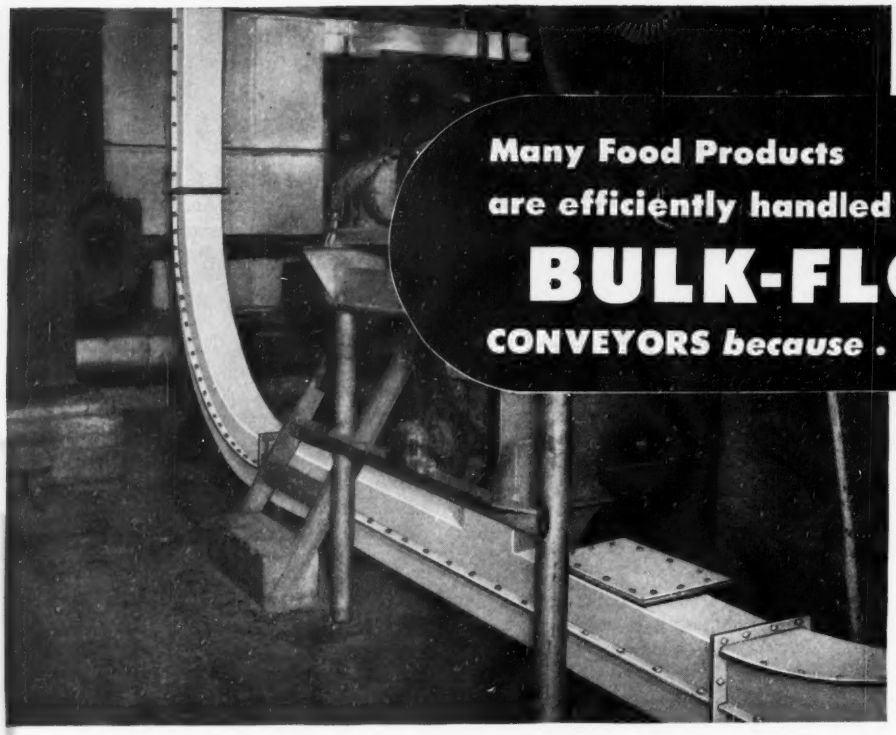
Frozen concentrated prune juice comes to market with an interesting processing wrinkle. In an auxiliary operation, pits are ground and the flavor essence solvent extracted and added to the concentrate. Two other starters in the frozen concentrate field are papaya and guava juice and pulp, from Kaaawa Farm, Hawaii. And Birds Eye promises a frozen tomato juice concentrate before the year end.

Unlabeled cans of food are automatically separated by a machine that deciphers magnetic markings electronically applied before filled and sealed cans enter cooker. Unit will handle five grades and identify contents through varying combinations of positive and negative charges on tops and bottoms. Capacity is 475 cans per min. Ingenuity pays off again. (See New Equipment.)

Another continuous evaporator has been developed. It's a high-capacity, three-stage, thermo-compression unit designed by Citrus Specialist C. D. Atkins and built in the shops of Pasco Packing Co., Dade City, Fla. It operates at night without direct supervision, because instruments control outflow Brix and keep input proportional to discharge. Evaporation is at 68 deg. F. Frozen concentrated juice really is advancing evaporator engineering.

Sharp teeth go along with tax-free oleo in the new margarine bill. Fines as high as $5,000 a day for each day of violation are stipulated. And FTC may require all industry to provide extensive proof of compliance with FTC regulations against price fixing, unfair trade practices and other violations. Looks like you are guilty until you prove innocence.

CIO Packinghouse Workers Union plans a 1,000-home development for its members to buy in Chicago. Union brought together state and city agencies and private builders to construct a planned community, including school, playground and park. Would be a fine world if all union activity were as constructive.



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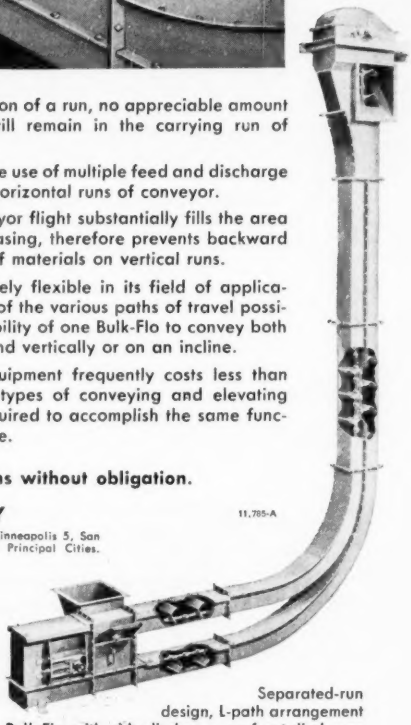


Separated-run design, L-path arrangement Bulk-Flo with side-discharge or front-discharge head section for multiple feed points and where feed control and accessibility are essential.

The Talk of the Industry

MSG Mystery Solved By Research

The mystery of monosodium glutamate—why it improves the taste of food when it has no flavor itself—seems to have been solved. Researchers at International Minerals & Chemical Corp. have analyzed 16 varieties of canned and 6 of fresh vegetables. All contained glutamic acid—with mushrooms, peas and corn ranking highest. The acid was also present in meats, poultry and seafood.

The fresher the vegetable, the more the glutamic acid. Cooked vegetables stored in the refrigerator keep most of their acid. Stored raw vegetables lose from 25 to 35 percent. Ergo, the conclusion: The extra goodness of young and freshly harvested vegetables is in part due to the higher glutamic acid content.

We know that monosodium glutamate works, but it's nice to understand why.

That Residue-Hearing Marathon

It is definitely estimated that the first part of the Food & Drug hearing on permissible spray residues on fruits and vegetables will continue until about July 1. This means that six months will have been consumed in making a record of the simple fact that crops cannot be grown commercially without insecticides, fungicides and other pest-control chemicals.

Yet to come are the more important and more controversial parts of the hearing involving residues on fruits and vegetables which are to be processed. So it may be years before a complete record will be had—if ever.

Welcome to British Meat Team

For the important purpose of studying high-productivity methods, teams of British food processors will visit this country under the auspices of ECA. The meat team, first on the schedule, is especially interested in canned meats, meat pies and sausage products.

Since the success of the Marshall Plan hangs upon the ability of Western European countries to increase industrial productivity, American processors can help to put it across by contributing some of the know-how which is old stuff in this country.

Kitchen-Fresh Bread in Limelight

Out of research in bread staling at Purdue University comes two hopes. One lies in the preparation of bread from hydrolyzed flour. The other is in the addition to bread doughs of certain amino acids, proteins, wetting agents or sugars.

A search for a wheat strain with waxy properties which would retard retrogradation was unavailing. But further investigation is proposed to check on the preparation of a wheat mutant by X-ray treatment, the idea being to produce a strain with waxy characteristics.

Meanwhile, another approach to kitchen-fresh bread is under study. Work is being done on the baking of half-loaves of sliced Brown 'N Serve bread. This is prompted by the howling success of the half-baked rolls, reportedly being produced by 100 bakeries to the tune of a million and a quarter packages a week.

What the shelf-life of these rolls will be when the warm and humid months come along is worrying some of the bakers. But until then, at least it's nice business.

Planned Progress on Frozen Standards

If they are to have F&DA standards, fruit and vegetable freezers mean to have good ones. So National Association of Frozen Food Packers has developed a detailed plan for assembling data on frozen asparagus and peas. From these data, an overall united industry position can be formulated. And the chances are good that mandatory standards, when issued, will be compatible with industry practices. Which means that they will help, not hamstring, the packers.

Dairy Tidbits From Here and There

Our recent travels brought us in contact with some interesting developments in the dairy field. In Louisville we came across a new all-aluminum case for milk bottles which not only is rugged and quite light, but prevents breakage of square milk bottles.

In a very modern small-town dairy we saw pneumatic tubes being used to quickly convey orders from office to loading platform. And a telephone at the platform was equipped with a home-made sound-insulated cover large enough for the telephoner to get his head inside. This pretty well shuts out plant noise.

We also learned that Eskimo pies without sticks are coming back on the market. These are designed for coin-machine dispensing. But still more interesting, Eskimo Pie bonbons will be introduced. They will be just the thing for movie theaters.

Hors d'Oeuvres

■ Noodle plant in New York found itself producing a highly flavored product whenever a nearby chemical plant went into production of a chemical equivalent of garlic. Go ahead! Let F&DA worry about the labeling.

■ One of our representatives suggests a Brannan Plan for the auto industry. From all we can gather, the food industry would be glad to give away the one that is threatening them.

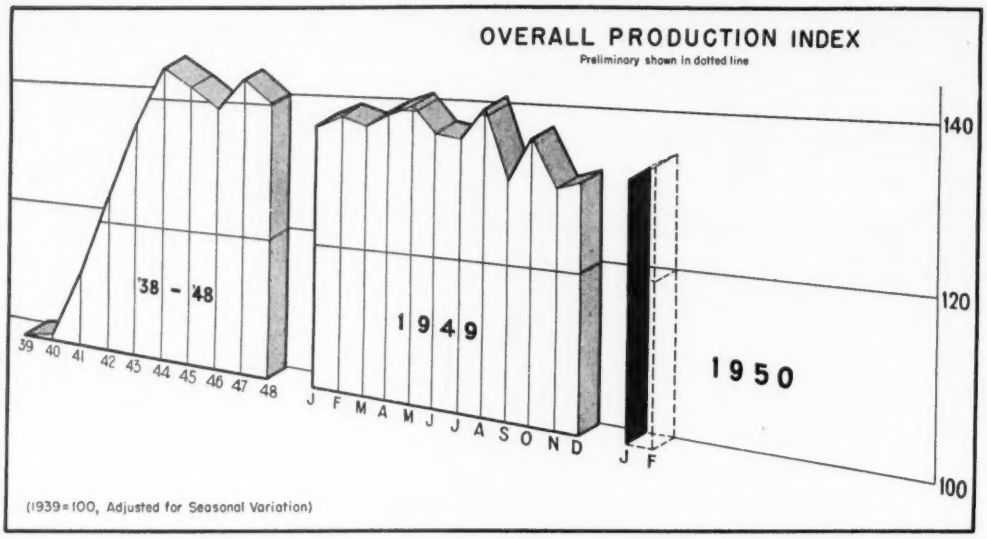
■ After 101 years in Brooklyn, A. Zerega's Sons, Inc., one of the nation's oldest macaroni and egg noodle producers, is moving to Fair Haven, N. J. Well, they stuck it out 101 years.

■ Even though you might have known all along that sauerkraut was not of German origin, it's fascinating to think the stuff was important in the diet of the builders of the Wall of China. And also to try to imagine how they pronounced it.

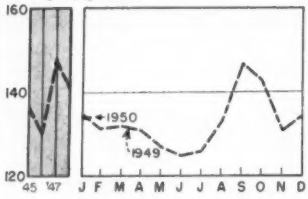
■ Farmer in Oregon decided radio music in the milking barn would be the thing. But with the first notes, all hell broke loose. The farmer just managed to get the thing turned off in time to save the barn. Could have been cowboy music, of course, but we suspect discontentment at long last.

—J.A.J.J.

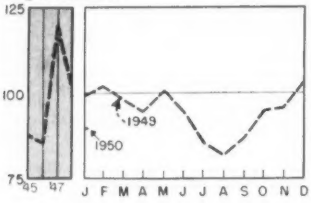
FI Index and Outlook



Candy Stays Put



Sugar Falls Off



At a Glance—

(1939 = 100, with all figures adjusted for seasonal variations.)

	Jan. 1950	Dec. 1949	Percent Change	Year Ago
Baking	121	123	−2	123
Butter	85	87	−2	77
Canning	146	144	+1	143
Cheese	181	180	+1	186
Confectionery	134	134	...	134
Evap. Milk	144	140	+3	132
Flour	112	112	...	128
Ice Cream	193	176	+10	180
Malt Liquors	158	150	+5	149
Margarine	295	284	+4	279
Meat Products	146	138	+6	144
Sugar	90	103	−13	100

Another Increase Is Registered In Food Production Pattern

RISING to a preliminary estimate of 135, February's overall food index continues the pattern established by the final January figure of 133.

Total food production is now running about a third higher than in 1939. But it is about 6 percent below the wartime rate or the postwar peaks established in 1947 and some months of 1948. Basic demand has not declined as much. Per capita consumption is only off 3 percent since 1947, while population has increased over 4 percent. And this latter is reflected in the higher unit volume of retail food sales.

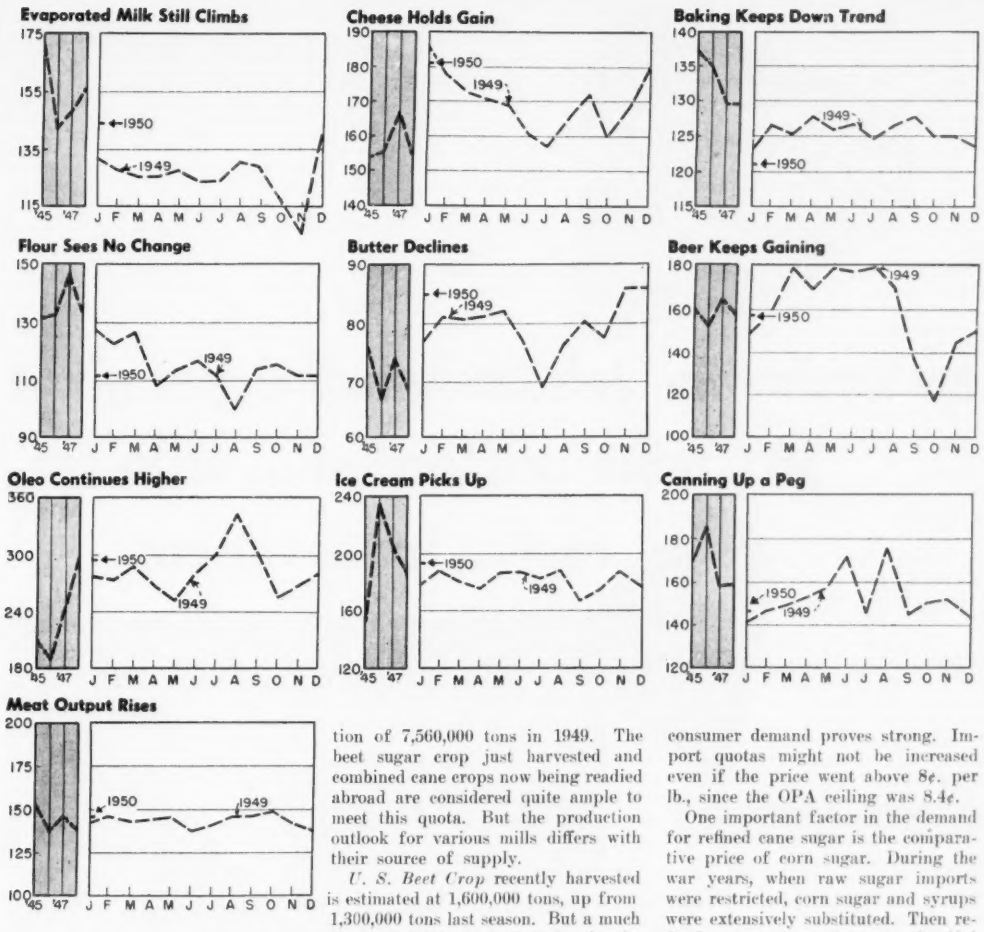
Apparently the 6 percent decline in processed food output during 1949 is a measure of the extent to which the industry has cut back on production for inventory and for the export market. In 1950, inventories are unlikely to be further reduced. But food exports will probably be smaller than last year. Preliminary estimates of shipments under the Marshall Plan indicate Europe will get along with less processed food from America.

Certain subdivisions of the food industry have been held down by decidedly lower per-capita consumption of their products. And for these branches, this is an important negative element in the outlook. Since 1947, consumption per person is off sharply for butter, canned vegetables and canned fruits. To a certain extent, these declines are offset by gains for margarine, for frozen vegetables, and for canned and frozen fruit juices. But there has also been a substantial drop in per-capita consumption of meat, due partly to smaller available supplies, and partly to consumer resistance to high prices. And consumption of sugar in various forms has also fallen off.

The effect of lower consumer demand for sugar has been particularly striking. Refinery production is now actually lower than before the war. Whereas the average American ate about 98 lb. of refined sugar in 1939, the figure for 1949 was only about 93 lb. The FI index of sugar refining has shown a similar drop, from 100 in 1939 to 95 in 1949. This illustrates the fact that output in any particular branch of the food industry may run counter to the trend of overall food production.

Sugar Prospects

There is still no sign that demand for refined sugar will recover to the pre-



war level. Production has, of course, recovered considerably from the low point reached last summer. Then deliveries of raw cane sugar to the mills were interrupted by shipping difficulties, notably by the stevedores' strike in Hawaii. The Philippine crop also fell short of expectations. The end of the Hawaiian strike, and increased imports from the Caribbean, permitted production to gain rapidly toward the year-end.

However, for 1949 as a whole, refinery output averaged below 1948. Main reason was lower production in other branches of the food industry charted here. The ice cream, soft drink, canning and confectionery divisions all operated at reduced levels, hence needed less sugar for ingredients.

Most sugar economists expect this downtrend to continue in 1950. The Department of Agriculture has set 1950 requirements at 7,500,000 short tons, compared with actual consumption of 7,560,000 tons in 1949. The beet sugar crop just harvested and combined cane crops now being readied abroad are considered quite ample to meet this quota. But the production outlook for various mills differs with their source of supply.

U. S. Beet Crop recently harvested is estimated at 1,600,000 tons, up from 1,300,000 tons last season. But a much bigger increase is looked for in the coming year. Beet sugar producers may surpass their assigned quota of 1,800,000 tons.

U. S. Cane Crop (Florida-Louisiana) will be reduced this year because of borer infestation and unfavorable prices. How much is not yet known.

Hawaiian Crop is expected to be up a little from 1949. And deliveries, of course, should be more normal.

Puerto Rican Crop is falling somewhat behind last year because of bad weather.

Cuban Crop is turning out much bigger than first expected. It should hit 5,500,000 short tons. That is enough to fill Cuba's quota to the U. S., and any U. S. deficits from other suppliers.

The relatively conservative import quota set for 1950 makes it unlikely that sugar prices will decline noticeably during the year. In fact, refinery prices might rise a bit from the mid-March level of 7.8¢. per lb. if consumer demand proves strong. Import quotas might not be increased even if the price went above 8¢. per lb., since the OPA ceiling was 8.4¢.

One important factor in the demand for refined cane sugar is the comparative price of corn sugar. During the war years, when raw sugar imports were restricted, corn sugar and syrups were extensively substituted. Then refined cane sugar became plentiful again. Its price dropped, to the disadvantage of the corn refiners. Restriction of cane sugar supply while corn is so plentiful will be a help to the corn product in 1950, if total demand for sugar proves larger than foreseen. This, of course, does not take into consideration probable quota adjustments.

However, there is also a good possibility of some firming in corn prices. They have been below government support levels. But future prices have recently advanced. And no one yet knows what the 1950 corn crop will be.

An interesting sidelight is the increased use of a raw sugar byproduct, blackstrap molasses, as livestock feed. Blackstrap from Cuba is now cheaper than corn at points close to the seaboard. That has made it an economical feed for some New York, New England and Gulf Coast dairy farmers. But transportation charges inland are prohibitive.

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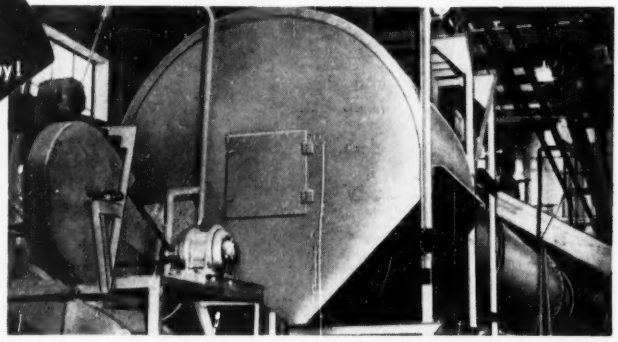

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Annual production (tons)	6,000
Drying cost per ton	4.65

(space required, 2500 sq. ft.)

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What Washington Thinks

SMALLER PLANTS—Washington notes with great interest that there appears to be a strong trend to the building of smaller plants. This tendency is opposite to the general trend of recent years, which was toward centralization of manufacture in relatively large establishments. Unquestionably, the reversal has come because freight rates are now about 60 percent higher than they were two or three years ago. This means that the delivery cost of an item at the merchandising establishment is increased by longer freight haul more than it is by the burden of smaller manufacturing plant costs. It is also noted that there is a much larger goods movement by truck, as a replacement of railroad movement. Exact figures are not available, but this development is clearly evident.

NEW CANDY RULES—Federal Trade Commission has issued for industry guidance a new set of "Trade Practice Rules for the Candy Manufacturing Industry". These became effective during the last week of February. In general the new rules deal primarily with merchandising. But even so, food technologists will find it worthwhile to look at them.

POTATO BAGS—Everybody has read about the potato problem. Perhaps not everybody has heard one of the stories that has stirred Washington even more than the hundreds of millions of dollars involved. This tale is about the selling of bagged potatoes at 1 cent per hundredweight in bags and then having the Government buy back the bags at 12 cents. each. If it were not so hard to get rid of the potatoes now that stream pollution is a real threat, one could, on such a basis, make a nice little cut by taking all of the $500,000,000 worth and just realizing the profit on reselling the bags.

COST OF MILK—Milk movement between milk sheds involves economic as well as technical problems for the milk products business. Lately, the Department of Agriculture made a study of the cost of delivery of 4,000,000 lb. fresh and skimmed milk to Memphis. This was 3 percent of the total local supply which came from Wisconsin. At primary shipping point, the realization by producers was $4.57 per 100 pounds. The transportation charge alone was $2.24 for the 668-mile haul. This looks like rather heavy loading. It shows why milk hauls are seldom long.

HORMONOLOGY—Maryland University investigators tell us how to make a synthetic hen from a young rooster. Clucking instead of crowing is not the major advantage claimed. The big gain is conversion of a relatively-less-marketable tough-meat cockerel into a tender-meat synthetic hen. One wonders whether poultry producing plants are going to require expert hormonologists in close control of plant operations. As a minimum, this type of development adds one more division of science with which the food experts must have at least a bowing acquaintance.

PATENT OWNERSHIP—President Truman has issued a new set of regulations reserving to the Federal Government all patent rights resulting from research and development made by investigators paid by public funds. Hitherto, some of the departments and agencies had allowed the inventors to exploit commercially their discoveries if they merely gave a shop right to the Government. Now, that policy is terminated. This means that taxpayers who have already paid for investigations which result in patents, will not have to pay a second time before using them in industry. Few of the details for control are yet worked out. But in general it may safely be concluded that the serious situation arising from private exploitation of patents by Government workers has now been removed, and the public will gain.

SWEAT PREVENTION—Food experts frequently are troubled by having a sweat of condensed moisture develop on material placed in warm plant areas after it has been chilled by refrigeration or otherwise. Many times the removal of goods from cold to warm locations can be accomplished without this difficulty, provided care is taken to have the warming up process take place in areas of relatively dry air. As the sticky weather of the dog days approaches, the smart superintendent will see whether he can route cool goods to warmer places via such dry spots, instead of moving them directly to processing areas where there is a great deal of humidity and free steam from process equipment.

"AUTHORITIES"—Again the Administration is quietly pushing for the establishment of more valley authorities like Tennessee Valley Authority. The Missouri and the Columbia are being given first support. Because of substantial opposition, which would be difficult to overcome successfully in an election year, it is not expected that any of these movements will soon culminate in new legislation. But any interested food enterprise should remember that the idea is far from dead.

A HOT POTATO—Secretary Brannan and Congress are tossing the potato problem back and forth. And it's a "hot potato", too. Each one is graciously giving the other credit for causing all the taxpayers' woes, apparently amounting to at least $200 million this year. Any action taken for corrective legislation or for better administration will be political aspirin, not a cure. Neither the Secretary nor Congress would have the temerity seriously to consider a real cure of this problem in an election year.

MORE DIETITIANS—Uncle Sam's Employment Security Bureau complains of shortages of dietitians for employment in hospitals, schools, and industrial establishments. The need for more skilled guidance in dietary matters at institutions is evidently being recognized.

The food industries should welcome this recognition and do what they can to help fill the jobs now begging for dietitians. Any institution which has competent professional guidance of this sort is a better customer for all makers of quality processed food.

LEARNER WAGES—The new minimum wage law requires that 75c. be paid per hour for employees of interstate industry. However, there is a special provision that learners and others of the apprentice class can be paid less while in training. It appears that Uncle Sam will approve readily applications for beginners' wages of 60c. or 65c. per hour, if such lower rate is in keeping with the custom of the company, the industry, or the craft employed. However, any abuse of such privilege is likely to result in its withdrawal from all cases. Stretching of learner periods of employment beyond actual need could boomerang.

—R. S. McBride, Washington, D. C.

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It's Solublized! PEPPEROYAL isn't just another pepper product. Users know it is unexcelled for true pepper flavor! The marvelous quality which makes PEPPEROYAL so distinctive is that of *penetrating and blending uniformly* with ingredients in your product. ● To achieve that result for you, Griffith extracts true pepper flavor from prime quality black pepper. Then, under laboratory control, converts it into PEPPEROYAL—minute flavor-globules that disperse easily and blend thoroughly. *It's Solublized!* ● Alone, or as one spice in a Griffith *Solublized* Seasoning Formula, PEPPEROYAL delivers true pepper flavor to the delight of your customers. Discover the advantages . . . order PEPPEROYAL today.

* Every seasoning formula—even yours—can be Solublized. Converting ground spice formulae to Solublized Seasonings is a Griffith specialty. Let us show you all the advantages.

The GRIFFITH LABORATORIES, Inc.

In Canada—The Griffith Laboratories, Ltd.

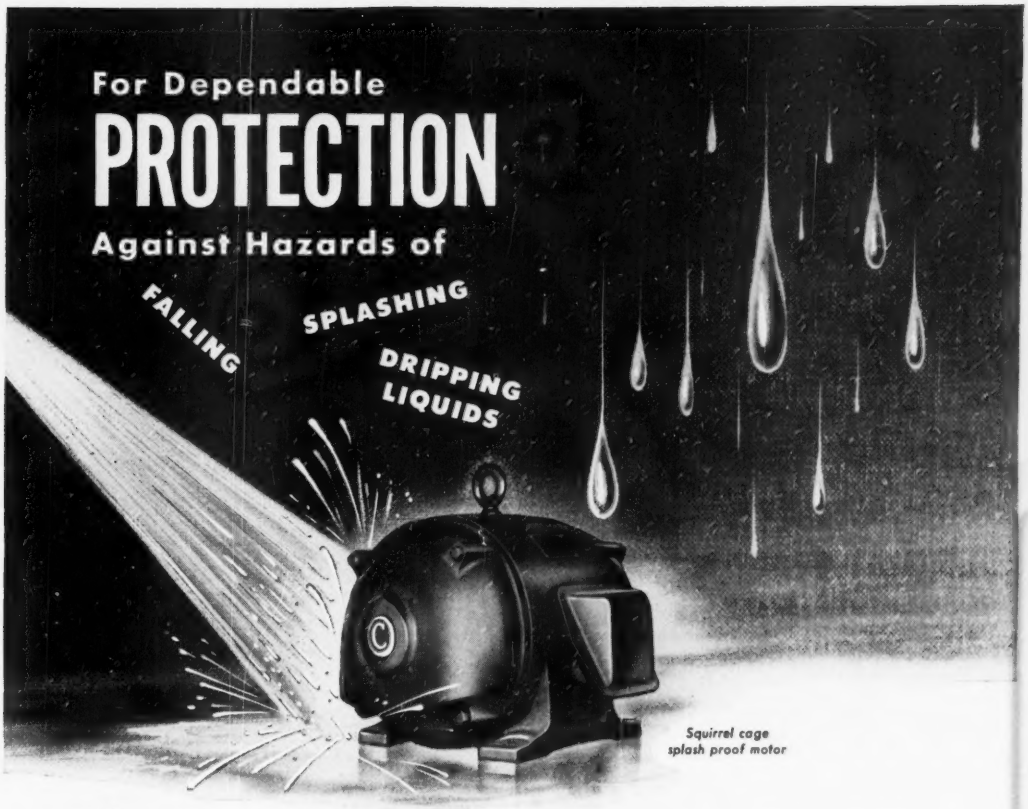
CHICAGO 9, 1415 W. 37th St. • NEWARK 5, 37 Empire St. • LOS ANGELES 58, 4900 Gifford Ave. • TORONTO 2, 115 George St.

For Dependable

PROTECTION

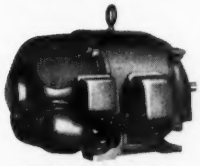
Against Hazards of

FALLING SPLASHING DRIPPING LIQUIDS



Squirrel cage splash proof motor

Direct current splash proof motor



Wound rotor splash proof polyphase motor

Repulsion start induction brush lifting single phase splash proof motor.

Use Century Splash Proof Motors

Whether installed indoors or outdoors, Century Splash Proof motors eliminate production losses caused by liquids entering the vital parts of the motor. The unique design of the Century Splash Proof frame prohibits water from entering, even when applied with the full force of a hose during a plant wash-down.

For many years Century Splash Proof motors have proved their dependability in chemical processing plants, dye houses, food and dairy plants—on outdoor cooling towers, oil well pumping units, as well as many others.

Wherever splashing liquids create a hazard, specify the correct Century motor housed in a splash proof frame.

For popular applications throughout industry, Century builds electric motors in a wide range of types and kinds—in sizes from 1/6 to 400 horsepower.

Specify Century motors for all your electric power requirements.

CENTURY ELECTRIC CO. 1806 Pine St., St. Louis 3, Mo.

Offices and Stock Points in Principal Cities

Century C MOTORS

671

ALTERNATING CURRENT MOTORS

POLYPHASE

Squirrel Cage Induction—1/6 to 400 H.P.
Wound Rotor Motors—1 to 400 H.P.
Synchronous Motors—20 to 150 H.P.

SINGLE PHASE

Split Phase Induction—1/6, 1/4, 1/3 H.P.
Capacitor—1/6 to 20 H.P.
Repulsion Start, Brush Lifting, Induction—1/2 to 20 H.P.

DIRECT CURRENT MOTORS

1/6 to 300 H.P.

GENERATORS

AC, .63 to 250 KVA
DC, .75 to 200 KW

GEAR MOTORS

1/8 to 1-1/2 H.P.

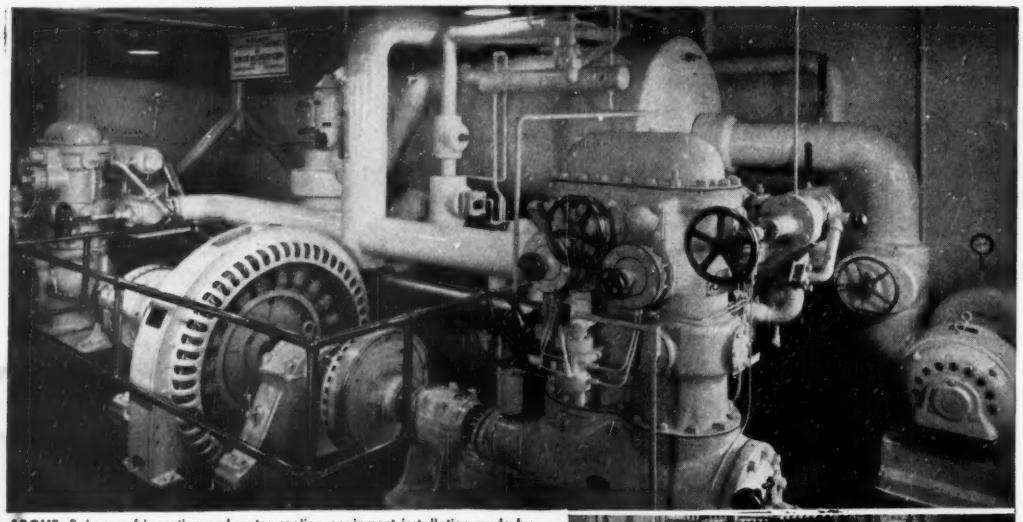
MOTOR GENERATOR SETS

AC to DC, AC to AC
DC to DC, DC to AC

Open Protected, Splash Proof, Totally Enclosed Fan Cooled, Explosion Proof.

Ball Bearing motors are factory lubricated for several years' normal service. Bearing housing construction permits easy relubrication when unusual service demands it.

Big Installation or Small . . .



ABOVE: Bakery refrigeration and water-cooling equipment installation made by York Ice Machinery Corp. At right: Typical compact units in a small locker plant —made by Baker Refrigeration Corp.

IN FROZEN FOOD REFRIGERATION

YOU GET MAXIMUM SAFETY WITH "FREON" REFRIGERANTS

As a frozen foods processor, storer, transporter, locker plant or retail outlet operator—whether large or small—you have an investment in frozen foods which requires the utmost refrigeration safety. A sure way to obtain maximum safety is to select refrigeration equipment designed to use "Freon" refrigerants.

"Freon" refrigerants are as pure as modern, laboratory-controlled methods of manufacture can make them. For example, there are not more than ten parts of moisture in a million parts of "Freon-12," the most widely used refrigerant. This dryness prevents freezing in capillary tubes and valves, and minimizes the possibility of corrosion from water and the sludging of oil in compressors, evaporators and condensers.

The purity and quality of "Freon" refrigerants insures efficient and continuous performance of your refrigeration system. And if a leak should occur, you'll be glad to know that "Freon" refrigerants can't contaminate food products or cause other damage. They are safe—harmless, odorless, tasteless, nonirritating, nontoxic, nonexplosive, nonflammable.

Remember these advantages of "Freon" refrigerants *before* you invest in refrigeration for frozen foods . . . whether a large or small installation is proposed. Be sure to discuss the subject with the equipment manufacturer or consulting engineer. He will gladly recommend equipment designed to use "Freon" safe refrigerants, available to meet every requirement in the field of frozen foods. It's a good way to protect your investment . . . easily.

Kinetic Chemicals, Inc.
Tenth & Market Sts., Wilmington 98, Del.

FREON *SAFE* REFRIGERANTS

"Freon" is Kinetic's registered trade mark for its fluorinated hydrocarbon refrigerants.

A WHOLE NEW CONCEPT OF INSTRUMENTATION IS REVOLUTIONIZING THE FOOD INDUSTRY FROM COAST TO COAST!

Consistent high quality pays off in the wine business . . . in economical production and in the development of favorable customer relations.

Knowing this, the Vie-Del Grape Products Co. of Fresno, California, decided to operate its brandy still under completely automatic control . . . a Brown Control System. The results exceeded expectations! Uniform high quality with maximum throughput is now the order of the day. Stillage loss is at a minimum . . . there are no more product variations caused by irregular performance. Mr. James Riddell, Vie-Del's President, was so pleased with the fruits of automatic operation that he has added control to his vacuum pans, fermenting tanks, heat exchangers, pasteurizers and refrigerating equipment.

Brown *creative instrumentation* is producing spectacular results throughout the Food Industry. Call in your local Honeywell engineer for a discussion of *control for your processes* . . . he is as near as your phone!

COMMERCIAL · RESIDENTIAL · INDUSTRIAL
WORLD'S LARGEST ORGANIZATION FOR ADVANCED INSTRUMENTATION AND CONTROL

Creative instrumentation is the engineered application of cost-reducing instruments and controls.

MINNEAPOLIS-HONEYWELL REGULATOR CO.
BROWN INSTRUMENTS DIVISION
4502 Wayne Ave., Philadelphia 44, Pa.
Offices in 73 principal cities of the United States, Canada and throughout the world

MINNEAPOLIS Honeywell — *Creative Instrumentation* FOR THE FOOD INDUSTRY — BROWN INSTRUMENTS

Now EVERY laboratory can use modern spectrophotometric methods

THE BECKMAN MODEL "B"

accuracy . . . speed . . . simplicity

AT A NEW LOW PRICE

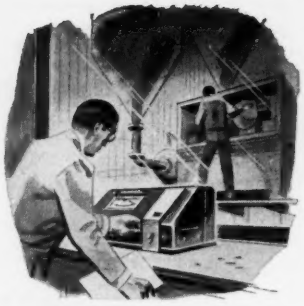
Spectrophotometric measurements—based on analysis of liquid, solid or gaseous samples by light absorption—have become one of the most important methods of today's process control operations. Complicated analyses requiring hours to perform by standard chemical procedures are now completed in a matter of minutes using modern spectrophotometric methods.

Up to the present, *quality* instruments have been beyond the reach of many laboratories. Now, however, the development of the new Beckman Model "B" Spectrophotometer makes available for the first time a *precision* instrument—convenient and simple to operate—*yet versatile, accurate and low-priced.*

The Model "B" combines many of the advancements pioneered in the famous Beckman Quartz and Infrared Spectrophotometers . . . high resolution . . . wavelength and photometric accuracy . . . freedom from stray light . . . wide spectral range . . . quality construction.

It features direct reading absorbance and transmittance scales . . . complete elimination of stray light from 360 to 1000 millimicrons—less than 1⅛% even at 320 millimicrons . . . interchangeable phototubes for wider wavelength range . . . inexpensive sample cells . . . 4-position cell carriage for faster readings . . . and many other important features.

The Model "B" is by all standards the outstanding instrument in its field. Write for full details. *Beckman Instruments, National Technical Laboratories, South Pasadena, 18, Calif.*



MANY VALUABLE APPLICATIONS IN FOOD PROCESSING

The Beckman Model "B" has many valuable applications in food processing. It can be used to control the quality and uniformity of food products . . . to detect impurities, harmful spray residues, etc. . . . and to check the content of important nutritional elements.

In addition, the Model "B" simplifies color control of both solid and liquid products—flour, spices, sugar, baked goods, liquors, condensed milk, fruit juices, soups, catsup, vegetable and mineral oils, and a wide range of other food products—wherever "color" is essential to attractiveness and marketability. The Model "B" reduces color specifications to definite fixed values that can be accurately reproduced, run-after-run, month-after-month.

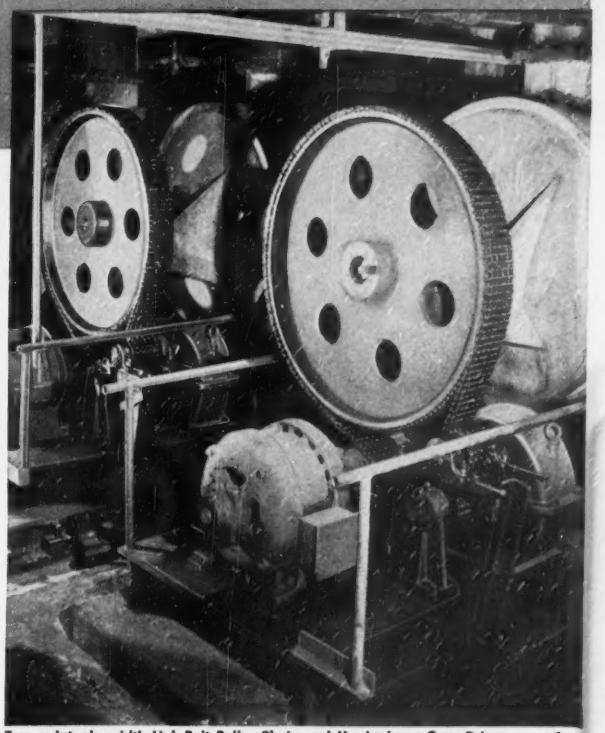
The Model "B" is also used for research into vital food problems, such as determining the condition of foods during cooking, freezing and other processing operations . . . studying the effects of storage on foods . . . and other similar analyses to advance food processing techniques.

Let our trained staff make recommendations on the application of Beckman Model "B" Spectrophotometer savings to **your** operations. No obligation, of course.

✻ Beckman Instruments include: pH Meters and Electrodes ✻ Spectrophotometers—Radioactivity Meters—Special Instruments

LINK-BELT *Precision Steel* ROLLER CHAIN

GIVES POSITIVE POWER TRANSMISSION PLUS LONG LIFE



Two quintuple width Link-Belt Roller Chain and Herringbone Gear Drives operating tankage dryers. These drives eliminated noisy, troublesome arrangements of bulky gears and spur pinions.

Performance on every type of equipment and in every industry proves the high quality of Link-Belt Precision Steel Roller Chain, incorporating the knowledge and experience of the world's largest manufacturer of chain.

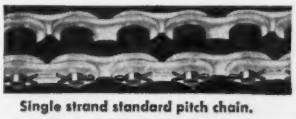
Positive transmission of power, efficient conveying, compactness, wide flexibility of arrangement, ability to absorb shock, are characteristics of roller chain which are enhanced by the precision manufacturing methods and metallurgical control followed in the huge Link-Belt chain plant.

Link-Belt Precision Steel Roller Chain runs slack on long or short centers, minimizing shaft bearing pressure, and operates at highest efficiency, since there is no possibility of slip. A number of shafts, turning in either direction, can be grouped in a single drive. The flexibility of each joint supplies a general cushioning effect, absorbing rather than transmitting shock from one shaft to another.

Link-Belt Precision Steel Roller Chain and sprockets are available immediately, in single or multiple widths, in ⅜" to 2½" pitch. Also with various types of attachments as well as the Universal Carrier, Flat-top, double pitch and horizontal plane bend types of chain. Made to manufacturers' (A.S.A.) standards. Send for Data Book No. 1957-A.

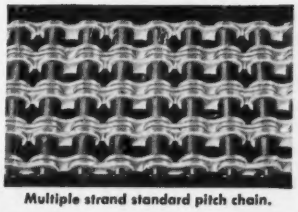
LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices, Factory Branch Stores and Distributors in Principal Cities. 11,834-C



Single strand standard pitch chain.

Double pitch roller conveyor chain.



Multiple strand standard pitch chain.

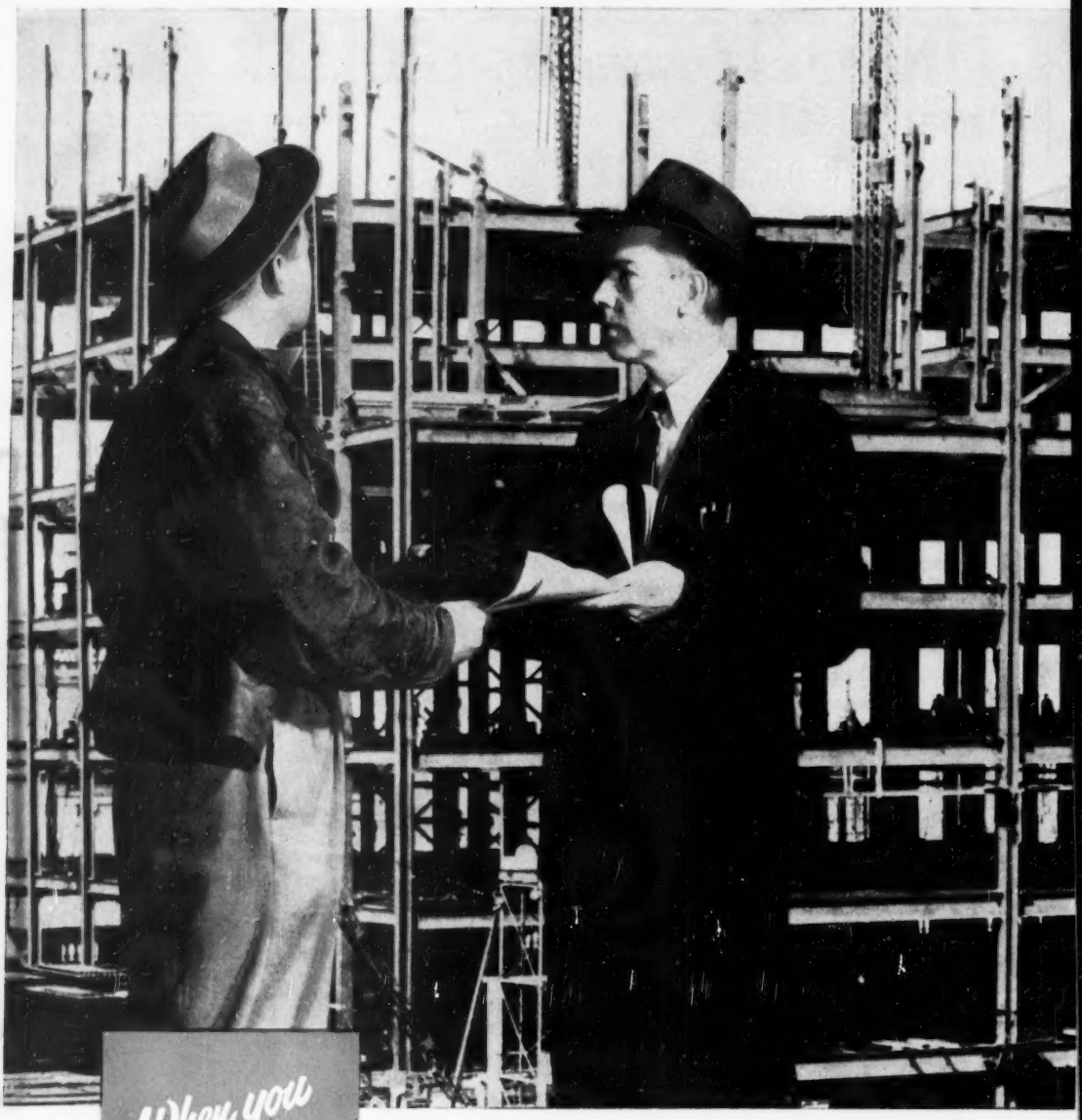
Universal Carrier chain, flexes in 2 planes.

Ewart Plant — Link-Belt Company — Indianapolis, Ind.

World's largest makers of Chains for Power Transmission and Conveying

LINK-BELT

ROLLER CHAINS & SPROCKETS



When you want the BEST go to the BEST

And for Packaging it's GLASS

The transparent glass package displays your products with all their colorful eye and appetite appeal. High in chemical durability, it does not change their taste or aroma, will not rust, corrode or leak.

Easy to open, easy to use, easy to reseal to protect unused portions, it makes the most convenient package. It lends itself to individuality in size and shape, hence is adaptable to any product.

Preferred by consumers because it is sanitary and convenient . . . by retailers because of its sales and merchandising advantages.

Anchor Hocking Glass Corporation, Lancaster, Ohio.

Anchorglass*

PLAIN ROUND JARS

For packaging pickles or mayonnaise, fruits, vegetables and many other food products, standard *Anchorglass* Plain Round Jars are ideal. They are available in 26 capacities, from 4 oz. to 128 oz.—in crystal, amber or emerald green glass. Tough and sturdy, they are designed to move efficiently through every packing operation. Consistency in manufacture, uniform distribution of glass, accurate annealing, strict quality control from selection of raw materials to finished product—result in uniformly strong, lightweight containers. Regardless of what you pack, there is an *Anchorglass* container that will completely meet your requirements.

ANCHORVAC*

P CAPS

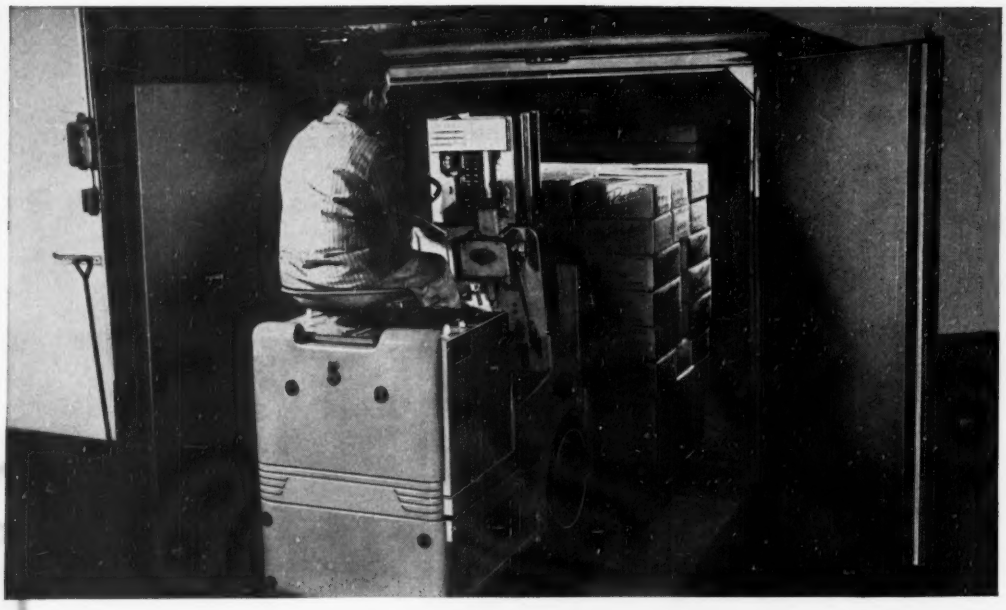
You'll like the dependable high vacuum seal of the *Anchorvac* P Caps. You'll like the ease and speed of application—75 to 250 per minute with the *Anchor* Steriseal Machine. You'll like their efficiency in sealing both fresh pack pickles with open bath sterilization and cured stock. Housewives like the cap because it is so easily removed, because it forms a fully hermetic seal when pressed back on. If you pack or contemplate packing pickles, let us tell you more about the advantages and economies of *Anchorvac* Caps, the *Anchor* Steriseal Machine and *Anchorglass* Plain Round Jars.

*Reg. U. S. Pat. Off.

For the BEST in Glass Packaging *it's*

ANCHOR HOCKING

"The most famous name in glass!"

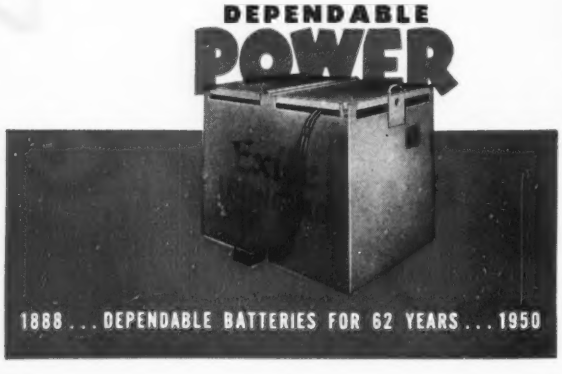


You get Split-second Handling with

Exide-Ironclad battery-POWER

Dependable Exide-Ironclad Battery power is your assurance of finger-tip control, accurate spotting, and steady operation of electric materials-handling trucks. Whether the load is light or heavy, Exide-Ironclads will deliver power instantly to meet all demands typical of *start-stop, lift* and *shift* manipulations of materials-handling trucks.

Exide-Ironclad Batteries assure full-shift trucking operations (around the clock or calendar) with no unscheduled periods of down-time to interrupt the flow of materials through your factory or warehousing operations.



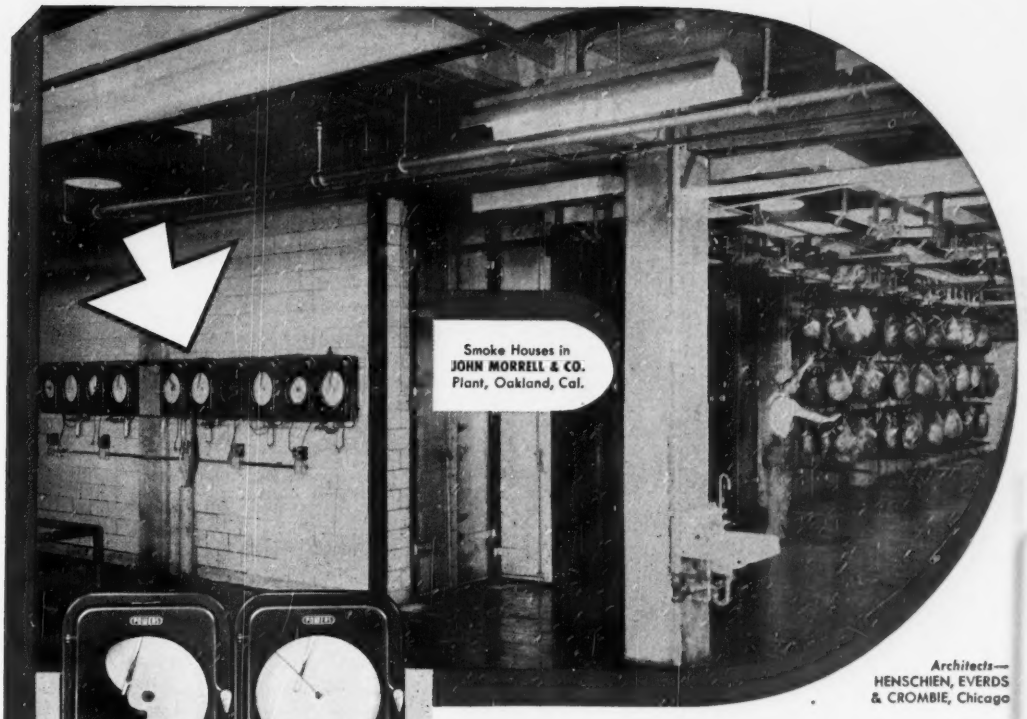
The Exide-Ironclad Battery is *DIFFERENT* from all other batteries . . . different in design, construction and performance. The main difference is the Exide-Ironclad positive plate, which accounts for the superior operating characteristics and the exceptional long-life of Exide-Ironclad Batteries in more than a hundred thousand rough, heavy-duty jobs since 1910.

The operating cost of an Exide-Ironclad is low . . . a battery of average size costing less than a nickel per hour to recharge. Maintenance costs seldom exceed fifteen cents per shift. These important factors, together with the exceptional long life of Exide-Ironclad Batteries, provide the lowest cost source of *dependable, full shift* power that can be bought *at any price.*

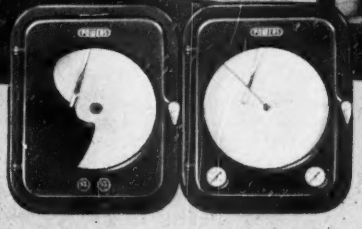
Write for more facts and FREE copy of Exide-Ironclad Topics. It contains latest developments in materials handling . . . shows actual case histories.

THE ELECTRIC STORAGE BATTERY CO.
Philadelphia 32
Exide Batteries of Canada, Limited, Toronto

"Exide-Ironclad" *Reg. Trade-mark U. S. Pat. Off.*



Architects—
HENSCHIEN, EVERDS
& CROMBIE, Chicago



POWERS TIME CYCLE RECORDING REGULATOR

Used by INDUSTRIAL AIR CONDITIONING SYSTEMS, Inc., Chicago, manufacturer of the five gas fired air conditioned smoke houses shown above.

For Better Quality Products at Lower Cost . . . Use

POWERS

Temperature • Humidity • Control

POWERS air conditioning control helps INCREASE PRODUCTION and produce a MORE UNIFORM PRODUCT

John Morrell & Co. high quality standards are rigidly maintained in their modern smoke houses. Uniform temperature, humidity and smoke penetration are assured by the large volume of air accurately controlled by Powers Equipment. Valves, dampers and static pressure regulators are pneumatically controlled by POWERS Time Cycle Recording Regulators. Records of operation are supplied on 12" recording thermometer charts.

When you want accurate control
of temperature or humidity for—

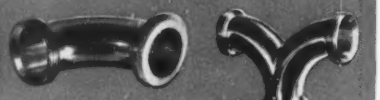
SMOKE HOUSES • COOKING VATS, RETORTS or KETTLES
DRYING, CURING or CHILLING ROOMS • SAUSAGE COOKERS
SLICING and PACKAGING ROOMS • SCALDING VATS
SAUSAGE CASING WASHING • WATER HEATERS

. . . phone or write our nearest office
for valuable aid in selecting the right type of control for your requirements. There's no obligation.
The Powers Regulator Co., Offices in 50 Cities.
2793 Greenview Ave., Chicago 14, Illinois.
231 E. 46th St., New York 17, N.Y.—1808 W. Eighth St., Los Angeles 5, Cal.—195 Spadina Ave., Toronto.
(SH)

Here's your ONE SOURCE of SUPPLY for ALL Sanitary Piping Requirements

The COMPLETE Line of 3A STANDARD SANITARY FITTINGS — VALVES

(Tri-Clover offers many exclusive additions to this line . . . some of which are included below)



37-31 REDUCING ELL

288X SWEEP TEE

14 AHE HOSE ADAPTER

14 HC HOSE COUPLING

21 I.P.S. TO SANITARY ADAPTER

45H CHECK VALVE

31-15F STREAMLINED REDUCER

60Q NO-LEAK VALVE

60 TFQ CHEESE VAT OUTLET VALVE

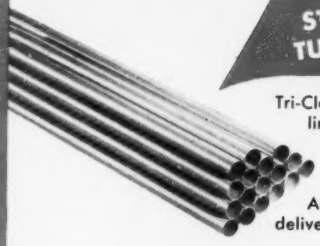
40 RTH RELIEF VALVE

HOLDING TUBE ASSEMBLY . . . ONE OF NUMEROUS TRI-CLOVER SPECIALTIES

PUMPS

NEW "PUMP KING" SANITARY PUMP . . . ONE OF THE COMPLETE LINE OF TRI-CLOVER CENTRIFUGAL PUMPS

STAINLESS STEEL TUBING AND PIPE



Tri-Clover now offers the most complete line of stainless steel tubing and pipe, in all popular stainless analyses, and in a full size range, polished or unpolished. All types available on "out of stock" delivery basis.

SUPER SPEED Tools

Vise and Expansion Blocks . . . hold Ferrules securely for expansion and facing of tubing.

ASSEMBLE YOUR SANITARY LINES WITH THE EXPANDED METHOD . . . THE ONLY APPROVED 3A STANDARD ASSEMBLY

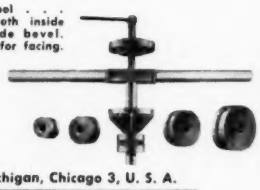
Costly, messy leakage of your product from worn, improperly seated sanitary fittings can be eliminated quickly, easily and at very low cost . . . by using Tri-Clover *Super Speed* Tools to service all sanitary lines. Features: Leak-tight joints . . . 60% faster, easier installation and maintenance . . . longer fitting life. (Partial line of tools illustrated—send for catalog.)

Torqometer . . . Provides easy expansion, through predetermined inch-pound pressure.

Sawing Vise . . . used in common bench vise to secure fast, accurate tubing cuts.

Expanders . . . Simple, efficient tools for accurate expansion, even with inexperienced personnel.

Seating Tool . . . Provides both inside and outside bevel. Also used for facing.



EXPORT DIVISION — 8 So. Michigan, Chicago 3, U. S. A.

Tri-Clover MACHINE CO.

Kenosha, Wisconsin

TRIALLOY AND STAINLESS STEEL SANITARY FITTINGS, VALVES, PUMPS, TUBING, SPECIALTIES

TRY TRI-CLOVER

FABRICATED STAINLESS STEEL INDUSTRIAL FITTINGS AND INDUSTRIAL PUMPS

THE Complete LINE

YOU CAN BE **SURE**.. IF IT'S

Westinghouse

"A THOUGHT FOR FOOD"

Sanitary Motor makes good housekeeping *easy*

Turn on the pressure—hot, steaming water and all! This Life-Line sanitary motor is built especially to keep water out . . . to make cleaning easy. Even the most meticulous housekeeper will approve its totally-enclosed, smooth steel construction.

Notice how the steel angle feet allow for easy cleaning with brush or pressure hose around entire motor exterior. Look at the self-draining streamlined frame. You can't see a crevice in which milk or food particles can lodge. There aren't any. Even the tapered edges of the nameplate are sealed to the frame by mastic cement. Joints between brackets and frame get this same treatment.

And don't look for grease cups or nipples. Life-Lines need no further lubrication. Pre-lubricated ball bearings require no greasing attention. Grease is sealed in the bearing . . . dirt and moisture out. There's no dripping grease any time, no matter what the mounting position.

Available now in ½ to 3-hp ratings, NEMA 203-284 frames, 2 or 3-phase, 110, 208, 220, 440-volt, 60-cycles. Ask your local Westinghouse representative for prices and complete details, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna. J-21556

If you figure LIFE COSTS... You'll figure LIFE-LINE

Westinghouse

Life-Line

Motors

INDUSTRY'S LEADING MOTOR

If you are PAYING for a Mack

Why not own one?

When you use a truck that doesn't measure up to its job, you pay for Mack performance . . . *but you don't get it.* You make a slightly higher initial investment when you buy a Mack, but *you save a lot more* by eliminating expensive repair bills . . . loss of earning power . . . costly road failures . . . untimely truck replacement. Today your dollar buys more in a Mack truck than ever before. Measured in terms of enduring reliability; sustained earning power; longer mileage life; lower ton-mile cost—every Mack is a real bargain in profitable hauling. See your nearest Mack branch or distributor. You'll find that, all things considered, the question is—can you afford *not* to own a Mack.

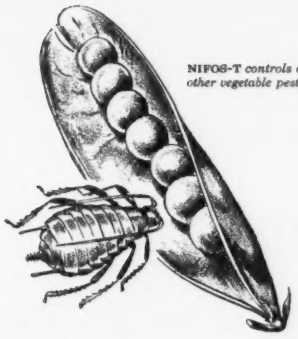
Be Profit-Wise

Modernize with

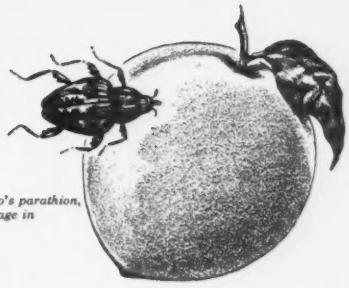
Mack

...outlasts them all!

Mack Trucks, Inc., Empire State Building, New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.



NIFOS-T *controls aphids and other vegetable pests.*



NIRAN, *Monsanto's parathion, checks insect damage in many fruits.*

COMPOUND 1080, *most powerful of all rodenticides. Extremely poisonous. Can be used in the food industry only in accordance with federal government regulations.*

SANTOBANE *kills many on-the-premise insect pests.*

SANTOBANE, *Monsanto's DDT, is efficient in controlling corn borer. MONSANTO 2,4-D halts weeds without harming most grains.*

Monsanto Chemicals help food industry get rid of costly weeds and insects

From the time crops pop out of the ground until foods are processed, weeds and insects threaten your production and quality. It's profitable for you to get rid of pests, and this long list of Monsanto Chemicals will help you do it:

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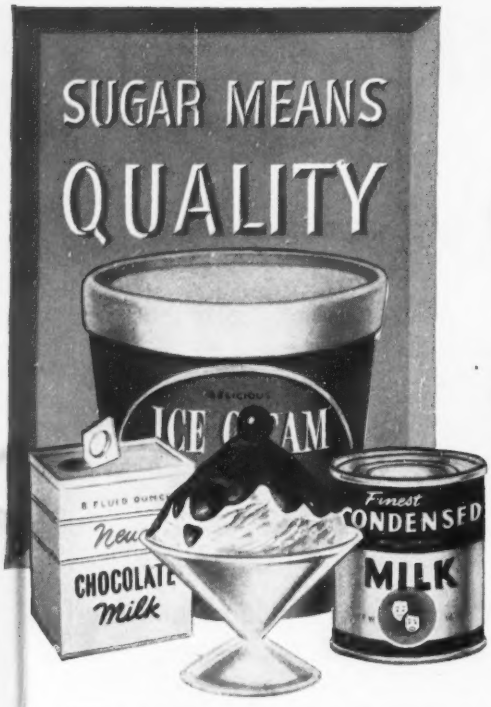

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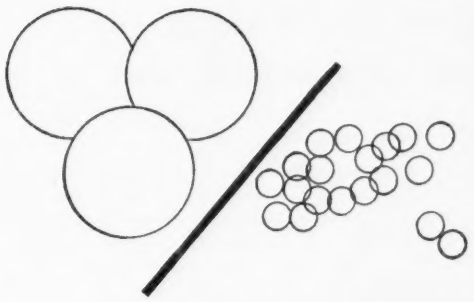

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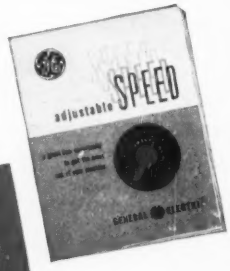

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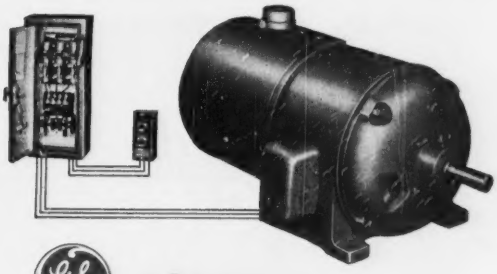

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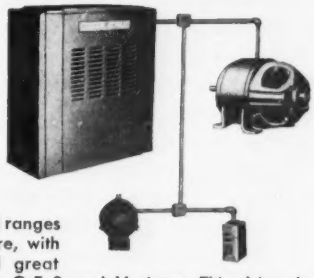

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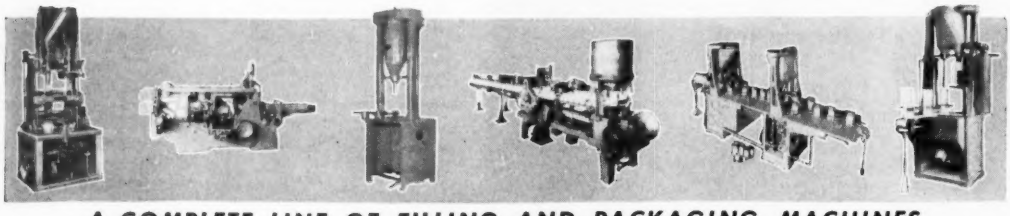
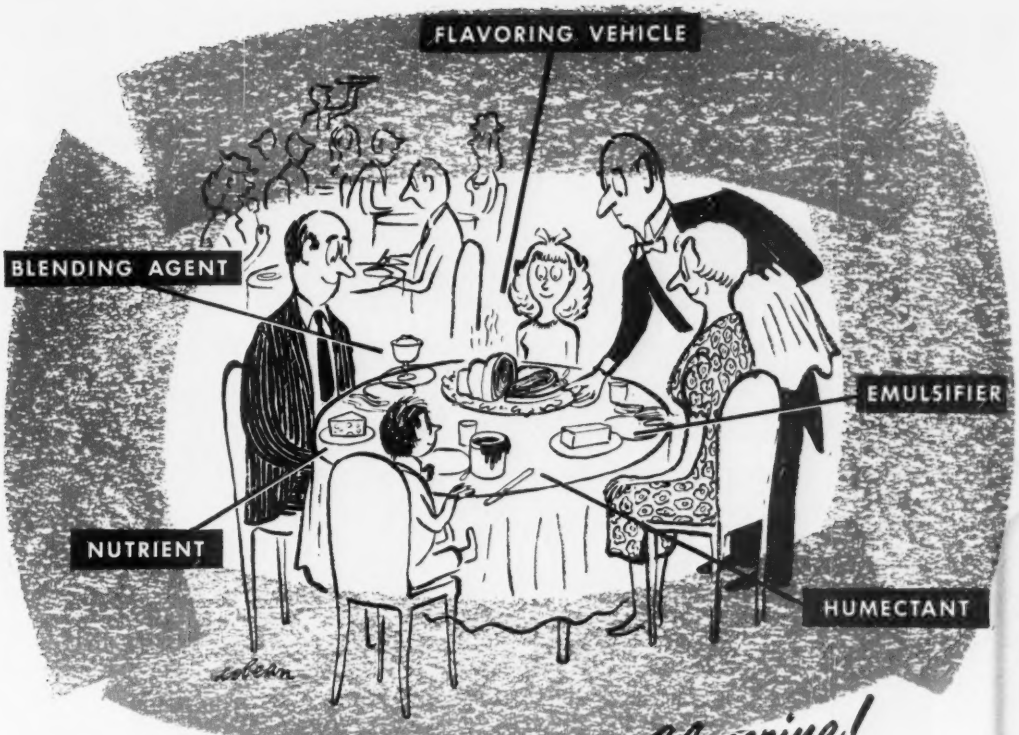


A COMPLETE LINE OF FILLING AND PACKAGING MACHINES



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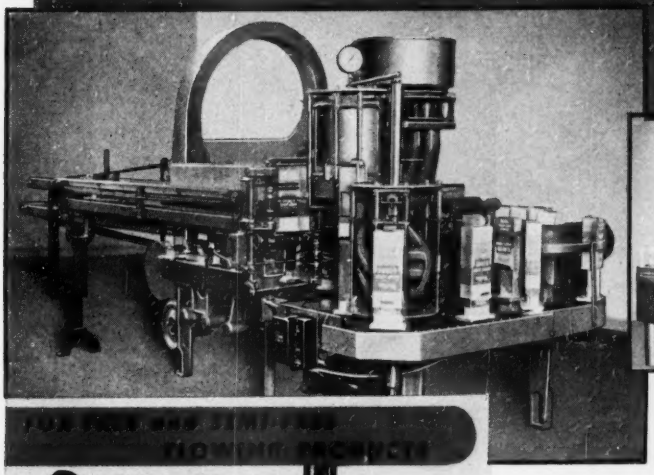
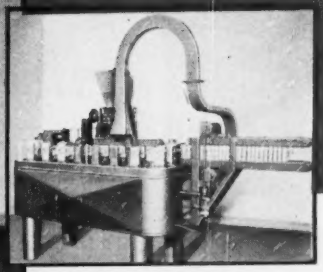
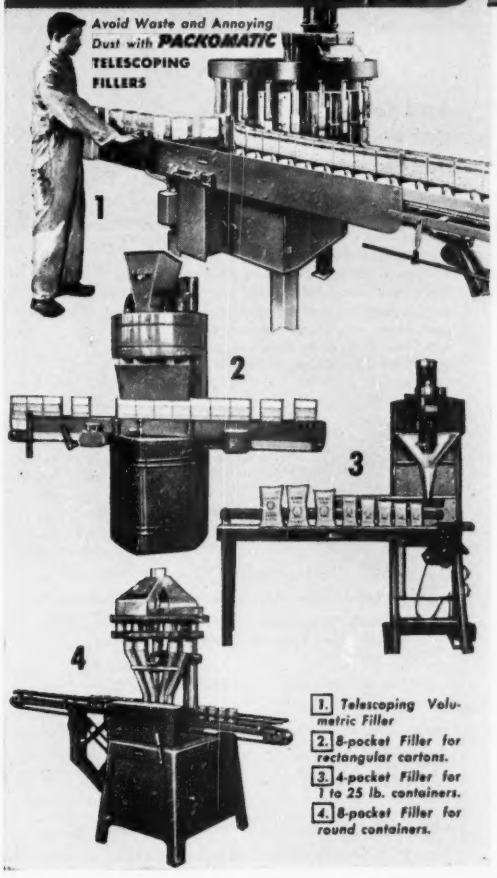




OUNCES TO POUNDS—standard containers or individual serving or sample packages, formed, filled and sealed automatically with PACKOMATIC top and bottom carton sealers and volumetric fillers. Standard model left; miniature model above.



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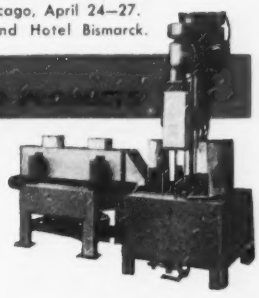

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APRIL, 1950

Food Industries

Packaging Opportunities Challenge Food Processors

There never was a time when critical analysis of the effectiveness of your package—and of the efficiency of your packaging operations—was needed more than now.

The requirements for good packaging performance are changing as self-service takes over in the retail field. The package now must be the product salesman.

Competition continues to sharpen, and if a product is to hold its own, its container must have all of the consumer appeals—eye, appetite, quality, quantity and convenience—even TV appeal if you use that medium.

With well-heeled consumers in a position to pick and choose their palate ticklers, your product must reach the kitchen with all of the appetizing qualities which you carefully put into it. This means you cannot afford to overlook any bets in selecting low-cost protective packaging materials or in designing good mechanical and technological performance into your package.

Because low costs are so devilishly important in these times of slim profit margins and tough competition, your packaging expenses should be shaved to a carefully calculated adequate minimum. This can be achieved only through simplified package design, careful evaluation of materials, installation of faster machines, and the purchase of equipment which eliminates manual jobs.

Now, just as there never has been a time when the need to meet these requirements was greater, so also has there never been a time when the opportunities for packaging improvement were more abundant.

All phases of food packaging have taken important strides in the postwar years. Designers have simplified artwork and container construction to give better appearance and performance at lower cost. Manufacturers have made available new materials with properties that enhance appearance, cut costs, provide better product protection and result in faster production-line performance. Equipment builders have developed machines with higher speeds, greater flexibility and lower maintenance cost.

It is up to the food processor to look into these facilities and take advantage of them. Evaluate your old package critically under the light of present opportunities. The special report on packaging progress in this issue will help you.

But catching up with the new is only the first step. The next is to evaluate and test the advantages of new developments in terms of your product, your plant and your market. Then comes the task of putting changes into effect.

Doing these things is not a one-man job. For many food products, successful packaging is more complex than the processing operation. For this reason, and because the right kind of packaging offers such great rewards, the brains of most departments in your company should be focused on packaging.

As detailed in our Package Check-List last May, a host of factors are involved which require the attention of management, sales and advertising, production, research and development, purchasing and legal people.

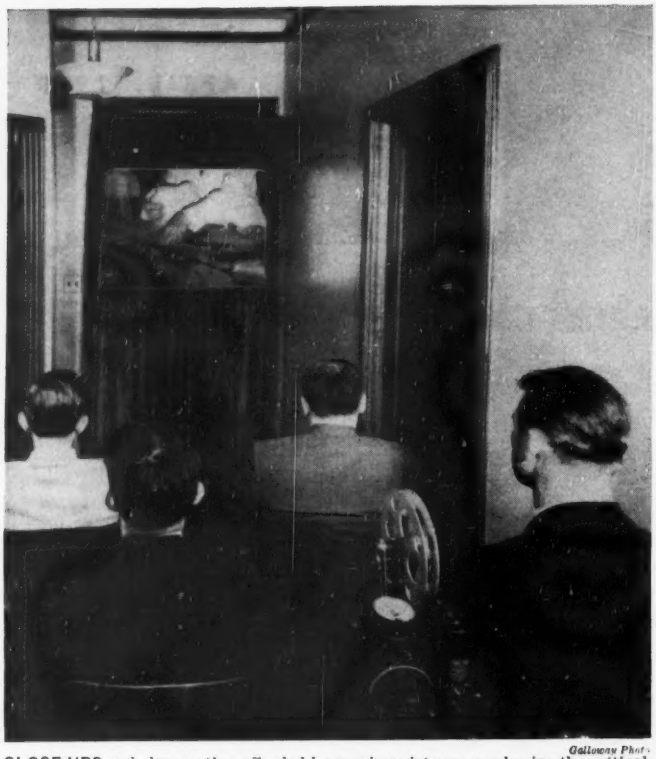
To bring all of these into the act calls for organization. You need a packaging committee—one headed by a man who knows something about packaging and who can make the committee function.

Is it worth all of this trouble? Well, consider the new self-service sliced-cheese package introduced by Kraft. To achieve this sales-builder, Kraft even had to devise radically new methods of forming and slicing cheese. It had to evolve a way to keep the slices from sticking together. Then it had to select a suitable protective wrapper and install the right packaging equipment.

It took a lot of cooperative effort on the part of Kraft's management, technical, and sales people to bring this off. But the company really got something for its efforts.

Other companies, too, can make better packaging pay off if they put the right organized effort into it.

—F. K. LAWLER, *Editor*



Galloway Photo

CLOSE-UPS and slow motion afforded by moving pictures emphasize the critical points that mean the difference between efficiency and lost time.

Time-Motion Improvements Come Faster With Films

Best way to do a job is determined quicker and taught better when motion pictures are used . . . How other studies can cut waste and increase output

GERALD NADLER

Assistant Professor, Industrial Engineering, Washington University, St. Louis

A very practical way to analyze the performance of a man or men doing work is the micromotion study, utilizing motion pictures and a timing device. The advantages of motion pictures are numerous. And among the most outstanding—when we take the canning industry as an example—are the following six:

(1) Since the canning season is short, much motion-and-time-study work must necessarily be performed during the off season. Taking motion pictures of operations and jobs during the regular season will permit the analysis of these plant performances at any later time convenient to the investigator. Frequently this person is too busy to do much about methods during the season, because the objective at that time is to get the product in the can. Hence, the convenience of micromotion study is not to be underrated.

(2) Motion pictures are, of course, a series of still pictures. In the normal "shooting", 16 still pictures are taken every second. The detail on film of the operations as performed by any person is far greater than could ever be obtained by the human eye alone. Many operators perform their jobs with small learned motions that are not readily perceptible to the eye. In the same manner, an unskilled person may be performing his job at such a rapid pace that he seems to be working efficiently. The detail afforded us by motion pictures allows us to find the better motions of the skilled person and the inefficient motions of the unskilled person. With this information it is then possible to find an improved method for performing the job.

(3) It follows quite readily that with motion pictures we get greater accuracy in our perception of the motions involved than is possible by eye observation.

(4) Training in canning plants has been virtually nonexistent. The procedure for placing a new person on a job has been to say, in effect, "Your job is to accomplish the following objectives. We feel sure that you will find a good way to do your job." The new person on the job would be extremely fortunate if he found what would be considered the correct method of performing his work. Here is where motion pictures come in. A film of the work can be employed to illustrate to the new worker the method he should use on the job. In this way, micromotion study serves the dual purpose of affording a means of analysis and a means of training.

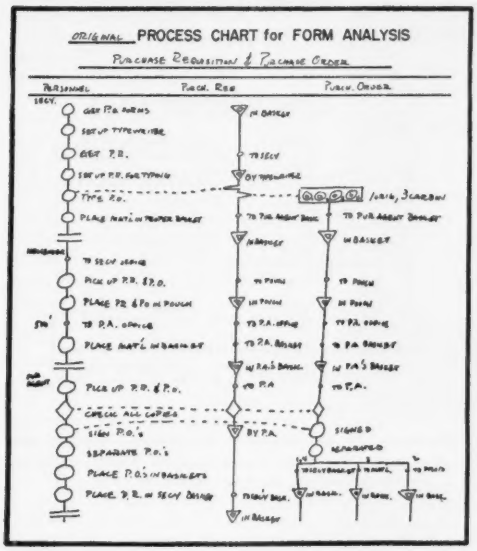
(5) With personnel of canning plants changing so often within a season, and from season to season, motion pictures represent a better record of a job for future use than could ever be devised by words. Frequently, the improved methods found in one plant can be demonstrated to other plants by means of motion pictures.

(6) The films used for micromotion study have many other uses. They supply the personnel department with a means for obtaining information regarding the skills and qualifications for certain jobs. They also supply visual records for conferences on job analyses, time study rates, and methods training programs. Moreover, they permit the study of improved methods on an ex-

Previous Pointers

Other practical motion-time technics for the food industry were detailed by the author in his special articles, "Industrial Engineering Cuts Labor, Time, Handling" (May '49 FI); "Simplify Your Plant Tasks the Symbol Way" (July '49 FI); and "Time Studies Help Processors Six Ways" (Feb. '50 FI).

Tracking Down Wrong Way



ANALYZED HERE are office flows of a purchase requisition and a purchase order, and activity of personnel concerned. Lines drawn horizontally across chart (dotted lines) will connect symbols representing occurrences at essentially the same time. Symbol meanings are as follows: Large circle, body member does something at one location; small circle, movement of form from one place to another, double triangle, holding time, no action; diamond, checking action by eye.

AFTER AN OPERATION is evaluated, best way to do it is determined and drafted as a job description. The one reprinted here details to corn plant husker women the improved method of doing their work.

Telling Them Right Way

JOB DESCRIPTION: Husker Woman

General Method

You may face the chute which carries the corn to your work place either with your right hand closest to the chute or your left hand closest to the chute. Whatever hand is closest to the chute will be called the inside hand, and the other hand will be called the outside hand.

The inside hand goes to and picks up an ear of corn. After grasping the ear, the hand positions the ear so that the butt-end will be nearest the body when it reaches the outside hand. As the inside hand moves to the outside hand, the ear is turned to the outward butt-end position as the ear is slid or positioned along the bottom of the chute.

The outside hand is kept almost stationary near the edge of the chute where the slots on the conveyor move past the edge. As the ear of corn is positioned into the palm of the outside hand, slightly press the ear into the slot. The inside hand will then go back and start its cycle again.

Special Considerations

(1) The eyes must focus their attention in the vicinity of 6 in. above the bottom of the chute and about 6 in. from the right or left side of the chute, depending upon the position of the operator. Keep the eyes on the ear that is to be grasped until its position is determined, since you may grasp the butt-end side or the silk-end of the corn. As soon as the position of the ear has been determined, the eyes should leave that ear and move a very short distance to the next ear to be pulled from the chute.

(2) To obtain greater comfort while performing the job, you must face slightly toward the chute. Do not attempt to align yourself parallel to the edge of the chute.

(3) Do not pull any stems or leaves from the corn and do not throw out any ears, leaves or stems.

(4) When placing the ear of corn in the slot be sure the buttend of the ear is close to the body.

(5) If a slot is missed, let it go! Do not try to fill the slot after it has gone by.

(6) The inside hand will get an occasional rest when a rather large quantity of corn slides down the chute so that a number of loose ears are near the edge of the chute. Let the outside hand do the work of placing the corn in the slots, giving the inside hand its rest.

perimental basis before installing such method on a production basis.

Micromotion study was applied to the job of the cutter women in a whole kernel corn canning plant. Here, the operator has the work of taking the ears of corn, coming to her by a chute, and placing them on the cutter-feed chain conveyor directly in front of her. Each ear of corn must be placed on the chain conveyor with the small end toward the cutter in order to prevent the jamming of the cutter.

Study Three Methods

There were 14 women on the job, and there were essentially three different methods for performing this job. The first method may be called a simultaneous symmetrical hand pattern—each hand picked up an ear of corn and placed it on the conveyor at the same time. The second method was an alternate hand pattern: As the right hand picked up an ear of corn the left hand placed its ear of corn on the conveyor, and vice versa. The third way was an asymmetrical hand pattern: The right hand picked up the ear of corn and flipped it to the left hand which placed it on the conveyor.

On production, the three methods scored nearly the same, with the simultaneous symmetrical hand pattern slightly ahead. However, the women using the alternate and asymmetrical hand patterns complained of tiredness and general physical discomfiture at the end of a shift.

Then films proved the point. Motion pictures were taken of the three different methods to determine which method was performed with the least waste effort. And results of the study showed that the simultaneous symmetrical hand pattern could accomplish the most production with the least effort. Using the suggested method, after a training period, the women who had earlier complained of fatigue found they were not nearly so tired.

Job Analysis Description

Operations in a canning plant are frequently known by their titles only. The personnel department sometimes has no idea as to the exact requirements of certain jobs. Granted, the foremen of departments know the methods, as well as the requirements, but they seldom have the time to fully explain

(*Turn to page* 170)

How Simple, Direct-Ammonia Cooling Operates

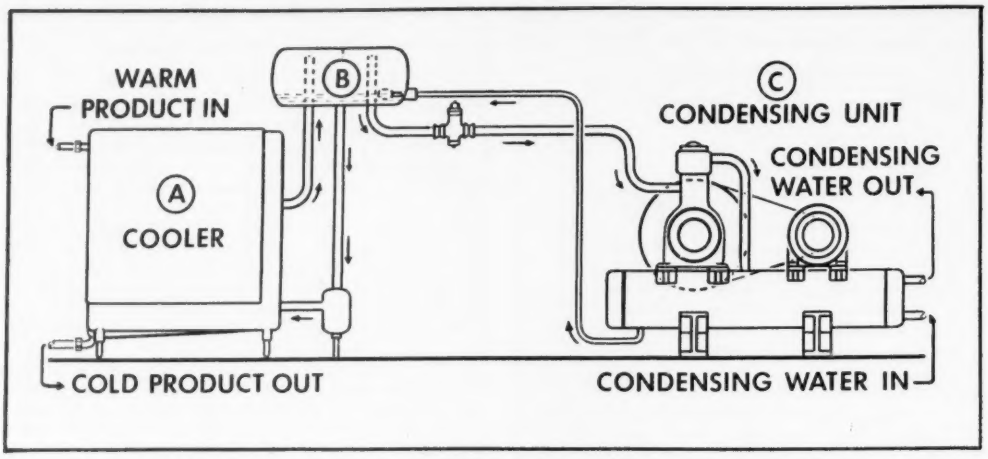


FIG. 1. WARM PRODUCTS are cooled at (A) by transfer of heat to direct ammonia. Arrows show flow of ammonia from condensing unit (C) through surge drum (B) to cooler (A). Gas, separated at (B), returns to (C).

You Can Cool It Cheaper With D.A.

. . . Meaning Direct Ammonia, which brings liquid foods to lower temperatures with less power and less cooling surface—and without any extra gear

H. G. MOJONNIER
Refrigeration Engineer,
Mojonnier Bros. Co., Chicago, Ill.

Savings of 30 to 40 percent in compressor horsepower and as much as 43 percent in cooling surface are two prime advantages of direct-ammonia cooling of liquid food products as compared with chilled-water cooling.

In addition, other worth-while savings are effected by the reduction in number of hours of compressor operation and total metered horsepower required to cool a given volume through a given range of temperature.

The dairy use of the system is notable. While not so well known or widely used in other food plants, direct-ammonia has long been recognized as an ideal method for dairy plant cooling. And the savings made in this industry are indicative of those obtainable when cooling such other liquid foods as fruit juices, ciders, wines, wort, beer, ale and syrups.

Three Types of Coolers

In the direct-ammonia method, the liquid to be cooled is on one side of the heat-transfer surface and the ammonia refrigerant is in direct contact with the other side (see Fig. 1).

These are the three main advantages of this system—:

1. Liquids may be cooled to lower temperatures.
2. Plant design and operation are simplified through elimination of intermediate heat-transfer units.
3. Uniform temperatures are attained in final products.

Coolers or evaporators using direct-ammonia are available in these three types: (a) Surface coolers; (b) cold-wall tanks, and (c) internal tube coolers.

The surface cooler (Fig. 2) is relatively simple in design and construction and its method of operation is easily explained. The liquid cools very rapidly while flowing over the refrigerated plates, and the cooling load is either on or off, depending upon whether liquid is flowing or not flowing over the cooler's surface.

The cold-wall tank (Fig. 3) differs in operation in that it cools and holds at the same time. The lower half of the tank is constructed with a jacket through which ammonia is circulated. The liquid product is agitated continuously and kept in intimate contact with the cooling surface. For that reason, a uniform refrigeration load is maintained whether a fresh supply of the liquid product is, or is not, being added. Also, since the product is in continuous contact with the cooling surface, extension of the cooling operation into off-peak periods is possible. Cooling of liquid products to very low temperatures in cold-wall tanks is common practice.

In the absence of agitation, cooling action is slight. This characteristic makes it possible to automatically relieve the refrigeration system during a period of overload by stopping the agitator through a pressure switch that operates when the suction pressure exceeds a predetermined level (Fig. 6).

The internal-tube cooler (Fig. 4) is a well understood design in which the product is circulated through tubes with the refrigerant in the shell. This design permits continuous cooling in a closed circuit and has the advantage of making possible the handling of the product under pressures at all times.

Five Successful Uses

In view of the aforesaid wide experience milk processors have had with direct-ammonia cooling, best examples of its application can be taken from dairy plants. These typical applications have to do with the five opera-

tions that are detailed in the text below.

1. Cooling Raw Milk at either the country receiving plant or the central processing plant. This is accomplished under the following two types of operating conditions:

First, with truck-tank pickup, in which the milk is received at the country plants and pumped directly into a waiting truck-tank. Cooling equipment must have sufficient capacity to handle the peak operating load. A flooded ammonia cooler of the type shown in Figs. 2 and 4 is used. Even though the temperature of the milk does rise several degrees while enroute to the central plant, cooling to 34 deg. F. at the receiving station permits delivery at 40 deg. or below.

Second, where milk is received during a short period, as during the morning in a country operation, and accumulated for later pickup or processing. Here, holding tanks are required. Rapid cooling to as low temperature as possible during the receiving period is desirable to insure that final products are of good keeping quality.

In this instance, the cold-wall tank is particularly well suited. Such an installation permits the milk to be pumped from the receiving vat as rapidly as it is weighed. Even when the tank is only partially filled, the ammonia compressor has a continuous load because it operates directly on the tank. Where the cold-wall tank is the only load, the suction pressure on the compressor will balance against the load on the tank and the cooling continues after the last milk is received.

The following is an example of the benefit derived from spreading the cooling load: In a typical operation involving the receipt of 7,000 gal. of milk in a 3-hr. period, based on cooling of the milk from 64 to 34 deg. F., it would be necessary to operate a 60-hp. compressor at 40 lb. (25 deg. F.) suction pressure to cool the milk when using a surface cooler.

But by using a cold-wall tank, and spreading the cooling over a 4½-5-hr. period, the milk can be cooled to 34 deg. F. with a 30-hp. compressor operating at an average suction pressure of 48 lb. (32 deg. F.). At the start of the receiving operation, when 64-deg. F. milk is pumped into the cold-wall tank, the compressor operates at 58-lb. suction pressure. At the end of the cooling operation with 34-deg.-F. milk in the tank, the suction pressure is 39 lb., giving an average temperature of 32½ deg. F. for the refrigerant in the tank.

An accompanying beneficial feature of the cold-wall tank is that the milk flash-cools to approximately 50 deg. F. upon entering the tank. This takes it

These Three Units Cool Products With Direct Ammonia

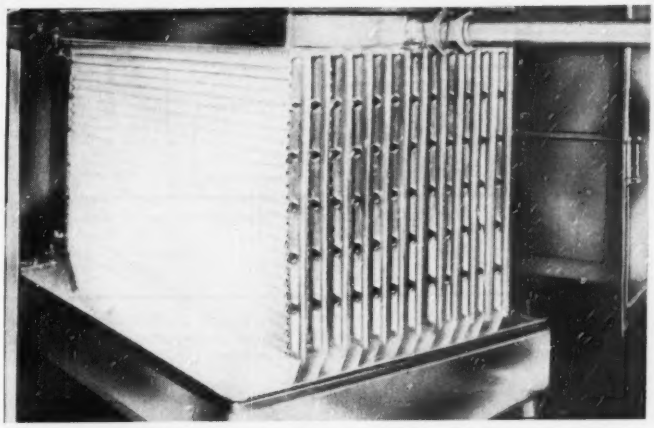


FIG. 2. SURFACE cooler employs ammonia-refrigerated transfer plates.

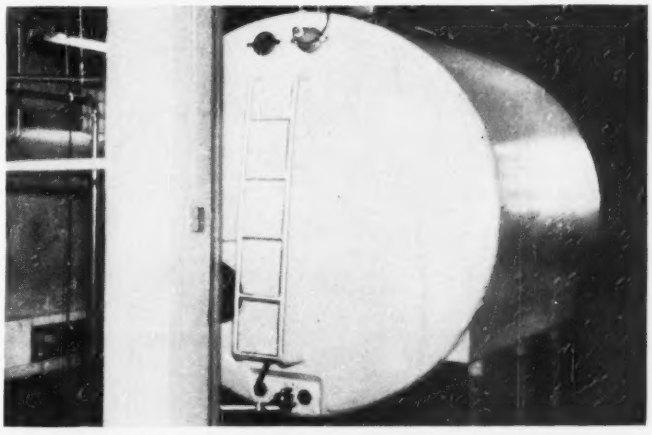


FIG. 3. COLD-WALL tank cools by agitating liquid over cooling surface.

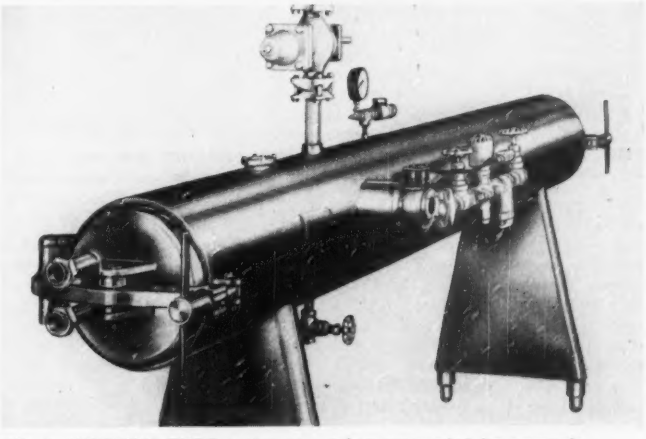


FIG. 4. INTERNAL-TUBE cooler uses tubes surrounded by ammonia.

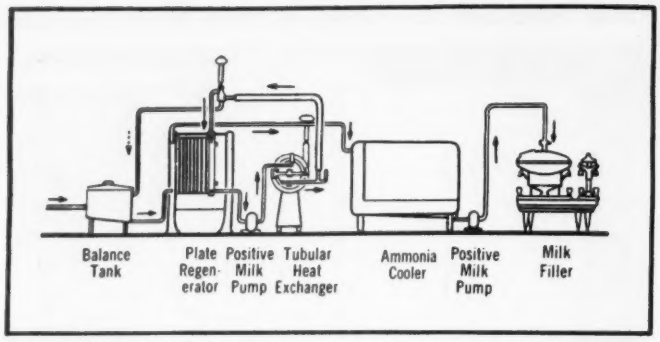


FIG. 5. SHORT-TIME high-temperature system for pasteurizing milk and cream employs plate unit for regeneration, tubular exchanger to complete heating, direct-ammonia surface cooler for final cooling.

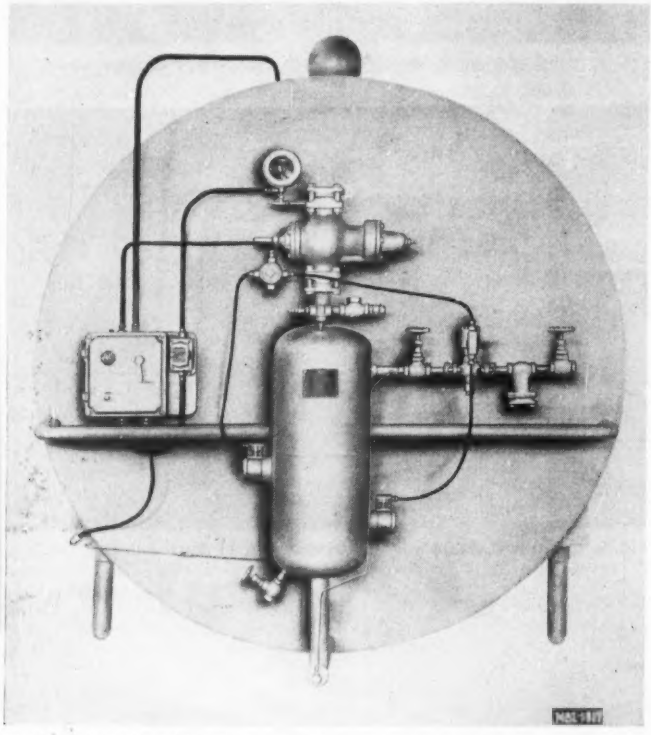


FIG. 6. AMMONIA CONTROLS, mounted on end of cold-wall tank, automatically stop agitator when demands on refrigeration system reach predetermined peak.

out of the dangerous temperature zone and permits stretching out the cooling period in the 50-to-40 deg. F. or lower range. Where the cooling load can be extended with a cold-wall tank, a much smaller compressor can be used since such a unit operates at a higher average, and more efficient, suction pressure. Also, a final milk temperature of 34 deg. F. is readily obtained, even with the smaller compressor.

In comparison, a considerably longer compressor-operating period is required if an ice-accumulator system is used, because of the lower suction pressure required to make ice. In addition, the cooling of milk to 34 deg. F. is impossible because of the secondary heat transferred to the chilled-water in the circulating system. Table I shows this relationship.

As indicated in Col. 8 of Table 1, a 20-hp. compressor must operate 5 hr. to cool 7,000 gal. of milk from 64 to 40 deg. F., when received over a 3-hr. period. To obtain the same quantity of refrigeration with an ice-accumulator system, a 7.4-hr. operating period is required. From the standpoint of cost alone, the cold-wall tank installation is less expensive, because an alternate installation includes an ordinary storage tank, a plate cooler, an ice-accumulator system, and a circulating pump. Moreover, extra floor space is needed to house the additional equipment.

2. Cooling of Pasteurized Milk. This is a batch operation wherever the holding method is practiced. Since regeneration is usually impractical on batch operations, the direct-ammonia cooler is commonly used. The upper section of the cooler uses well or city water and the lower portion direct ammonia to obtain milk at approximately 34 deg. F. for bottling.

Where the holding method is not practiced, the short-time, high-temperature system is widely used. These "flash" systems are operated with or without regeneration. However, regeneration is usually employed.

Such an installation, with regeneration, is diagrammatically shown in Fig. 5. A plate unit is used for regeneration, and a tubular heat exchanger, utilizing direct steam, completes the heating to the pasteurizing temperature (162 deg. F.). Pasteurized milk leaves the regenerator at approximately 64 deg. F., depending on the raw-milk temperature and the surface area of the regenerator, and goes to a direct-ammonia cooler for final cooling.

Table II shows the size compressor required on a direct-ammonia cooler. Requirements are based on obtaining two typical final milk temperatures—40 and 34 deg. F. Presumably, the raw milk has been stored at 34 deg F. When milk is sent to the regenerator at 34 deg. F. or lower, the final refrigeration load on the pasteurized milk cooler is decreased.

Bottling Raises Milk Temperature

Temperature of the milk is raised when it is filled into warm containers (see Table III). And the packaged milk remains at this higher temperature after it is put into cases, unless the cases are individually iced. Experience shows that worthwhile reduction of the milk's temperature, during storage in the cold room, is neither practical nor possible because of lack of air circulation between stacked cases. For that reason, removal of heat from the milk is obtained with the greatest ease and maximum economy during the cooling operation ahead of the filler.

Use of chilled water, circulated through the milk cooler, is an alternate to the use of ammonia. If a

Tests Prove Efficiency of Direct Application

TABLE I—DIRECT-AMMONIA Method Consumes Less Power (Comparison with Ice Accumulator in Cooling 7,000 Gal. of Milk)

	Average Operating Conditions		Capacity 30 Hp., 6½ x 6½ Compressor Operating at 300 Rpm., 170 Lb. Head Pressure			Total Hp. Required	Hours of Operation	
	Pressure Lb.	Temp. Deg. F.	Tons	Brake Hp.	Hp. per Ton		6½ x 6½ Compressor Cooling From 64 to 34 Deg. F.	5 x 5, 20-Hp. 440 Rpm Compressor Cooling From 60 to 40 Deg. F.
Direct ammonia	48.0	32½	33	27	0.82	1,230	4.5	5.0
Ice accumulator	33.5	20	24	23	0.95	1,425*	6.2†	7.4

* Does not include power to operate circulating pump, nor demand charge. Latter is less with ice accumulator.

† Since it is not considered practical to cool to 34 deg. with ice accumulator, this value is theoretical.

TABLE II—HORSEPOWER REQUIRED to Cool 12,000 Lb. of Milk Per Hr. With Direct Ammonia

Cooling Range Deg. F.	Tons of Refrigeration	Total Connected Compressor Hp.
64 to 40	24	25
64 to 34	30	35

Note: Cooling load is at rate of 1 ton per degree.

TABLE III—TEMPERATURE OF MILK AT FILLER is Important Factor in Obtaining a Cold, High Quality Product

Milk Temp., Deg. F.	Bottle Temp., Deg. F.	Final Temp., After Filling, Deg. F.
34	85	42.5
40	85	47.5

TABLE IV—CHILLED-WATER COOLING Requires 75 Percent More Surface Than Direct Ammonia

Product	Cooling Range Deg. F.	Refrigeration Tons	Ammonia Temp. Deg. F.	M. T. D.	K Factor	Surface Required Sq. Ft.	Cooling Plates Needed
Milk	64–34	30	30	14.02	200	128	4
Chilled water	44–34	30	30	8.00	200	225	7

straight chilled-water circulation system is installed, the same size compressor is required as for a direct-ammonia system. If an ice-storage system is used, the cooling load can be handled by a smaller compressor operating over a longer period of time. However, chilled-water systems have the following two drawbacks:

First, it is practically impossible to cool milk to 34 deg. F. with them.

Second, they are more expensive to operate than direct-ammonia because of pumping costs, heat losses through pipe lines, and charges arising from the greater cost of the equipment (see Table IV).

An analysis of cooling-surface requirements will show the operating relationships between the different methods for cooling. A direct-ammonia cooler requires 128 sq. ft. of surface for cooling 12,000 lb. of milk per hour. To do the same job with a chilled-water circulating system, 225 sq. ft. of surface would be required in the water cooler alone. This surface is in addition to that in the milk cooler.

Smaller Compressor Runs Longer

When ice accumulators are used, the lower cost of the smaller compressor is offset by the larger investment in the ice-accumulating equipment and by the considerably greater cost of power resulting from the relatively lower operating suction pressures. A lower power-demand charge is an offsetting advantage, but an ice-accumulator system has no capacity to absorb overloads once the ice-making capacity is used up.

A point to be observed when cooling with direct ammonia is that the compressor should not be operated without a load. When the cooler is the only equipment using refrigeration, as is the case when direct ammonia is used, the compressor can be started and stopped from the short-time pasteurizer controls. Common practice is to start and to stop compressor equipment automatically up to 60 hp. and multiples thereof.

Another aid in obtaining maximum operating efficiency is to tie the compressor into the plant system in such a way that it will pick up a load from other units during intervals when there is no load on the direct-ammonia milk cooler.

3. Cream Cooling. This represents a relatively small load, and the stainless steel cream cooler can either be operated from the ammonia control on a nearby direct-ammonia milk cooler or it can be provided with an independent ammonia control. The amount of equipment required to cool cream by direct-ammonia is also less than that needed by a chilled-water circulating system. Also, cooling of cream to low temperatures is possible because the refrigerant temperature can be set at 28 deg. F. or lower.

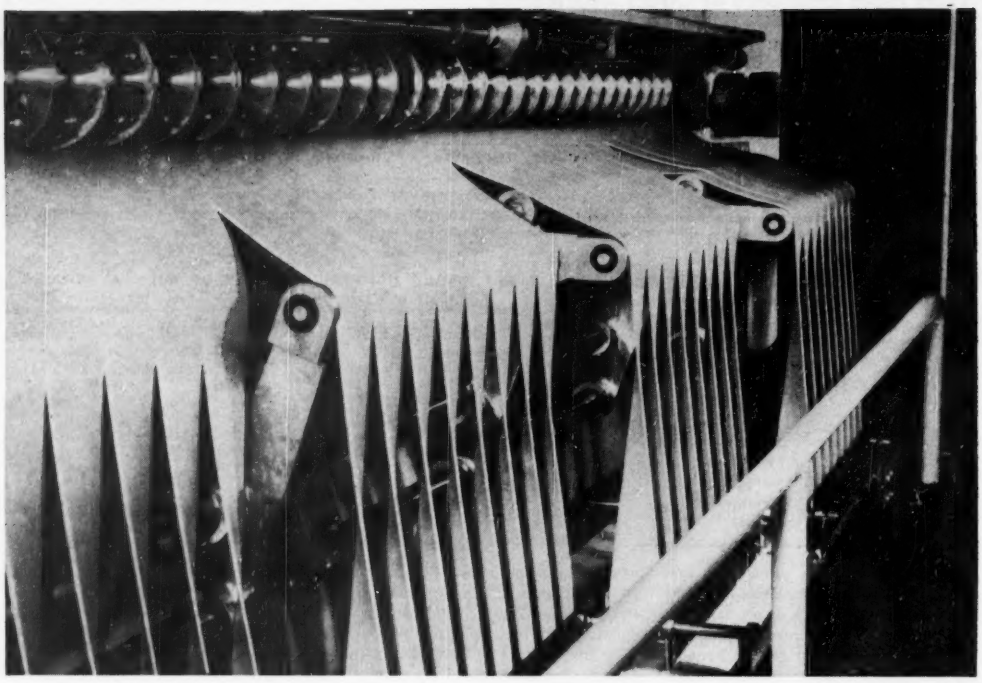
4. Pasteurized Cream and Buttermilk Cooling. This differs from the cooling of milk and non-heated cream in that the pasteurizing and cooling are done in vats. Here, either steam or hot water is circulated through the jacket of the vat for heating to pasteurizing temperature. Then cooling is obtained with city water preliminary to application of chilled water to reach a final product temperature of about 40 deg. F. Use of a small direct-ammonia stainless steel cooler, similar in design to the one shown in Fig. 2, is recommended to produce chilled water for this operation.

This cooler can also be used for butter wash water. In this case, the water cooler is located adjacent to the vat or churn.

An alternate method for use with buttermilk is the installation of an internal-tube ammonia cooler for direct cooling to temperatures approaching 36 deg. F. Lower product temperatures are possible by this method of cooling.

5. Ice Cream Mix or Evaporated Milk may also be cooled economically on a direct-ammonia surface cooler. The upper section of the cooler uses city water and the lower part ammonia. A common practice is to set the ammonia temperature at 25 deg. for cooling to 28-to-34 deg. F., provided that stabilizers producing a thin-bodied mix are used. A final temperature of 38 to 40 deg. F. is the usual level when the mix is heavy bodied, as is the case with some types of stabilizers.

Although the examples cited in the foregoing are applications of direct-ammonia cooling to dairy products, counterpart applications are now proving successful in the cooling and handling of liquids in other food processes. To be sure, operating conditions and cooler designs and construction may vary somewhat from those used in milk processing, but the changes should not be of great magnitude and the derived benefits should be comparable.



1 **THREE-INCH RIBBONS** are cut from large sheet as it comes from surface of chilled rotating drum. Sheet, which is ⅛-in. thick and several feet wide, is formed by spreading melted cheese, just after it is pasteurized, over drum.

Cheese Formed, Cut, Packed Continuously

New method employs specially designed equipment to sheet, strip, assemble and "square" the food product in 8-slice, ½-lb. heat-sealed packs—all automatically

FI STAFF

From the melted state to the sealed package in one continuous operation—that is how Kraft Foods Co. produces its new factory packaged process-cheese slices.

Each package contains eight 3-in. square slices, weighs ½ lb., and is machine-wrapped in coated cellophane and then heat-sealed.

Instead of being sliced from a loaf, the pasteurized cheese, while still fluid, is formed into a thin sheet, which is later cut into the squares. During exposure to room temperature, the physical condition of the surface of the cheese is altered in a manner to prevent the packaged slices from sticking together (a difficulty previously experienced when cheese was sliced from a loaf). This alteration is so effective that no difficulty with sticking has been experienced, even when the cheese has been subjected to softening temperatures and slight pressure.

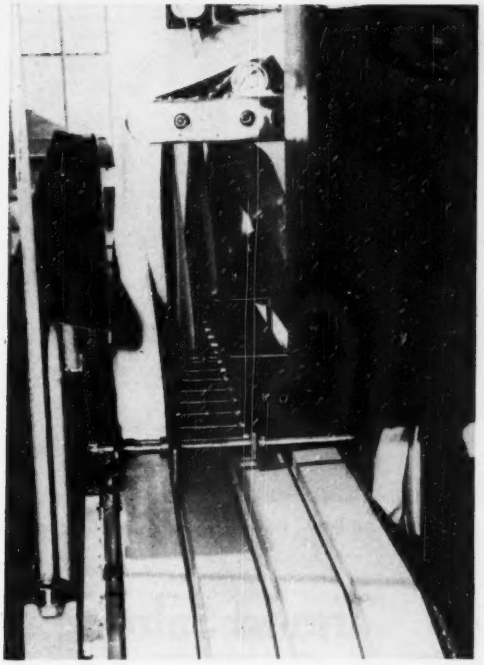
The unique continuous manufacture of the cheese slices embodies a special process and special machinery developed over years of experimentation.

The usual initial steps in process-cheese making—grinding, blending and pasteurizing or plasticizing—have not been changed. Upon leaving the pasteurizer, however, the new process comes into operation. The melted cheese is run onto a chilled rotating drum, where it is cooled and, at the same time, formed into the thin sheet, several feet wide and ⅛-in. thick.

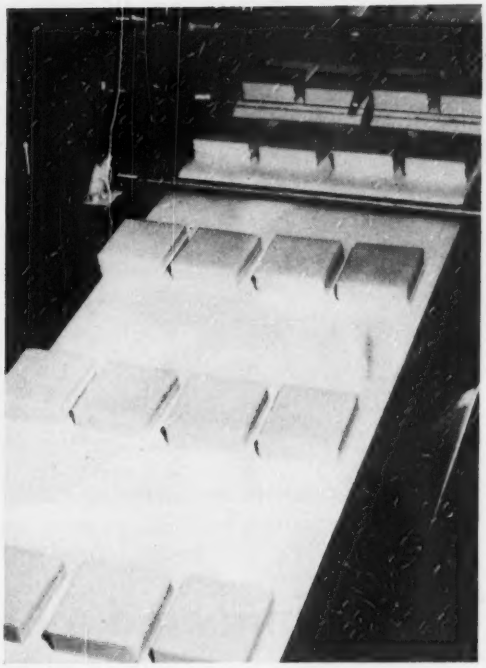
As the cooled sheet comes from the drum—at the rate of 150 lb. per min.—it is first cut into 3-in.-wide ribbons by a series of revolving knives (see photo above). These ribbons are automatically gathered (in stacks of 8) and move on endless belts to the cross-cutting machine. Here, a cutter slices through the stacks to produce the ½-lb. packages of eight 3-in. squares.

Cut stacks are conveyed to machines that automatically wrap and heat-seal the packages. Sealed packages are conveyed to the packing department for assembly in cartons.

At present four different flavors of the process cheese are being turned out. In addition to their identifying names, these packages are further individualized by the different colors used as background on the large labels—light blue for American, dark blue for Swiss, dark red for pimento, and blue and white for "Old English".



2 **RIBBONS** are assembled into these four, continuous 8-strip stacks and conveyed to cross-cut operation.



3 **STACKS OF 3-IN. SQUARES** are cut from ribbons to form ½-lb. packages. Rate: 300 a min.

4 **HALF-POUND QUANTITIES** are automatically wrapped and heat-sealed, then conveyed (right) to packing.

5 **SLICES** are easily separated and removed, as needed, from special "close-back" cellophane wrapper.

COMING from new machine (upper left) are special boned, skinned salmon loins. Inspectors remove adhering skin.

They Engineered a Better Canned Salmon

Special machines, now installed on canning line, produce higher quality pack by removing backbones and skins. Latter are tanned into leather

RALPH M. BERGLUND
Director of Research, Pacific American Fisheries, Inc., Bellingham, Wash.

A boneless, skinless canned salmon—termed a significant improvement—has been developed. Utilized are two new machines. One removes the backbone, the other the skin.

Since the beginning of the salmon-canning industry back in 1864—when Chinese labor hand butchered the fish and other workers hand-filled it into home-made cans—canned salmon has been produced without notable improvement in the final product.

But there has come a long list of mechanical and engineering innovations. Among them are: (1) Automatic cutting and filling machines; (2) the sanitary can; (3) the Iron Chink—the mechanical butchering machine that removes head, tail, fins and viscera at 72 fish per minute; and (4) the Foonken Indexing device, designed to position the salmon accurately so that the Iron Chink's guillotine would sever only the head and gill bone, curbing losses of edible flesh.

These changes came about because the industry was forced to lower processing costs. For one thing, labor costs are very high in Alaska. Common labor for the Territory's salmon canneries is provided with transportation to and from Alaska, food, housing, laundry and tax coverage during actual canning time—all in addition to union wages. This extra expense for the canneries brings total cost of labor to $13 hourly for white and $6 hourly for Oriental labor in mid-Alaskan areas.

New Unit Bones, Skins Fish

As stated, the latest improvement—this time in quality of product—is the production of the new kind of canned salmon. This development began in 1945 when Pacific American Fisheries of Bellingham, Wash., leading salmon canning firm, devised two new machines for boning and skinning the fish. Preliminary packs of boned-skinned salmon were successfully offered to the trade.

Complete Picture

The entire mechanized salmon-canning line is graphically portrayed by photos and full diagram in this month's special foldout flowsheet. Just turn to pages 100-103.

Incentive for such a pack arose from a consumer survey which indicated that salmon skins and bones were objectionable to a large number of consumers. In further laboratory tests, this company experimentally packed salmon skins alone and ascertained that these skins had an odor and flavor not associated with canned salmon. Salmon bones, canned separately, tasted like chalk, indicating that flavor from the flesh penetrates into the bones in the regular packs. By 1947, this company had constructed five sets of salmon boning and skinning machines which produced 60,000 cases of boneless-skinless salmon.

Salmon Leather Is a Byproduct

Having produced an acceptable edible product, the researchers next turned their attention to the possibility of utilizing salmon skins. Making salmon leather seemed the answer. After over a year of research, a leather of acceptable quality was produced that interested leading leather brokers and manufacturers.

The grain in the leather is attractive and its scale pattern is non-uniform, making it almost impossible to duplicate. Before tanning the skins, surface scales and adhering flesh must

be removed. The leather is dyed in all the conventional colors used for ladies shoes and handbags.

Fishing boats bring the salmon to the cannery dock, where they are unloaded onto an elevator leading into the cannery. Fish are weighed, then routed by overhead conveyor to fish-storage bins, workers sorting them into the respective bins according to grades, species and sizes. Salmon are then flumed from the bins to the hopper at the start of the canning process.

Operation Sequence

First unit on the processing line is the Foonken Indexing device, which requires two operators. One provides a constant flow of salmon from hopper to indexing unit, and the other positions the fish on the chain conveyor that travels across a plate under the indexing fingers.

As each fish moves toward the next machine—the Iron Chink—an indexing finger slides along the body of the salmon, applying sufficient pressure so that when it reaches the gill it engages the gill bone. With the indexing finger accurately positioning the salmon as the chain conveyor carries it forward, the fish finally reaches the guillotine, where only its head (with gill bone attached) is severed from the body.

There are five of the indexing fingers moving on an elliptical track. After positioning a fish, they recede and move around the track to the point where they pick up and position another fish. Two indexing machines, combined with two Iron Chinks, will butcher 9,000 fish per hour.

While there are no accurate figures showing the savings attained with the indexing machine, some operators credit it with recovering at least 7 percent flesh which was formerly cut off by other beheading devices.

Comparing performance, a good butchering crew, when physically fresh, probably can attain results equally as good as the machine. But when fatigue occurs during long shifts, wastage results.

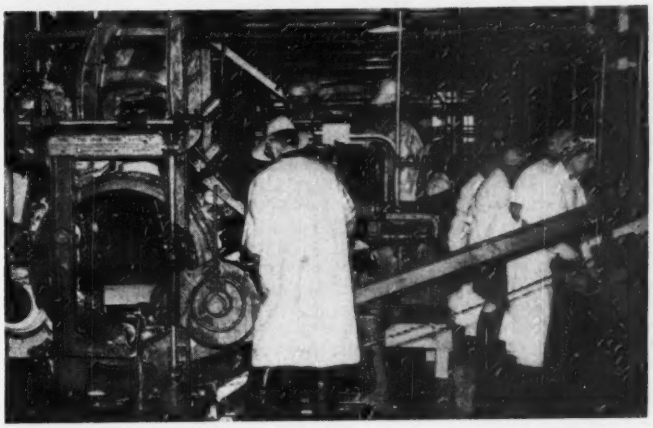
Reason for this loss: A tired worker, bent on being careful, is inclined to hold back a bit as he steers the salmon into the guillotine. This results in a cut at a point farther down the body from the gill bone than is obtained by the mechanical guide. The new machine is commended for its safety features.

Fish Automatically Butchered

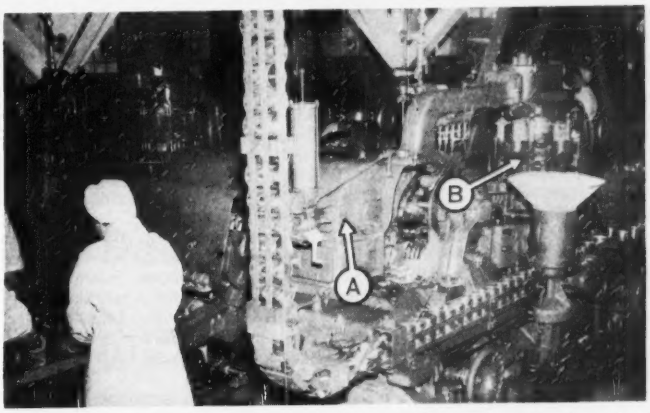
The next unit on the line is the Iron Chink, that automatically eviscerates the fish and cuts off fins and tails. This unit replaces Chinese labor formerly used to hand-butcher salmon.

A worker feeds the headless fish,

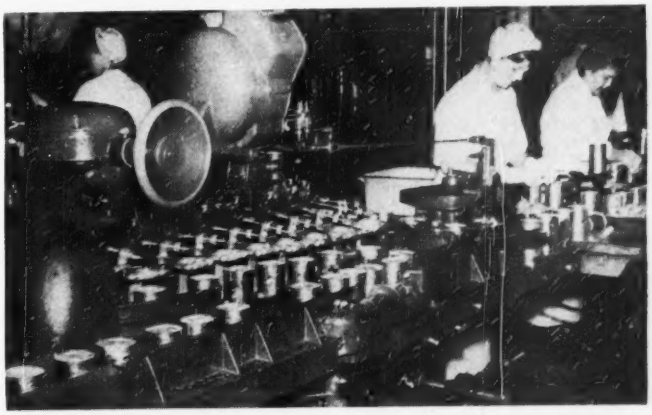
Salmon Are Butchered, Filled Into Cans and Weighed



"IRON CHINK" butchers 72 salmon a min. Machine's circular saws cut off head and tail, remove dorsal and ventral fins, and take out viscera.



LOINS from boning and skinning machines are fed to cutter (A) where they are sliced to length. Rotary unit (B) measures and fills fish in cans.



WEIGHING MACHINE diverts underweight cans to patching line, where they are filled to proper weight. Cans then go to vacuum sealer and retort.

tail first and belly up, into a feed trough. In the center of the machine, a bull-wheel first catches fish by the tails with pincer-pins. Then come these seven actions. (1) Circular saw cuts off tail, (2) three sets of pinch pins hold fish, (3) saw removes ventral fins, (4) another saw cuts off dorsal fins, (5) still another saw opens belly from anus to the head-end, (6) belly-flap spreader enlarges belly opening, and (7) two circular scrapers—blooder and gutter—remove viscera while a water spray washes the cavity.

Eviscerated and prepared fish are released from the pins and drop onto a conveyor at the bottom of the machine, which carries them to the sliming tables. Viscera are confined to the immediate area by shields and a concrete curb surrounding the machine. From this area, the viscera is flumed to a waste hopper.

Workers on the inspection tables remove any remaining viscera—including the large aorta artery—that may have been missed by the Iron Chink. After washing the body cavity, these workers then place the fish on a conveyor which takes them to a bin from which they are drawn to feed the third machine—the PAF (Pacific American Fisheries) fish-boning unit.

Unit Takes Out Backbone

Only the backbone is removed by this unit, since small rib bones are not objectionable in canned salmon. The boning machine has a revolving, ½-in.-dia. cutter head and two circular knives. Here are the steps: An operator places the salmon over a horizontal steel indexing rail. Running directly beside the rail, two endless spiked chains grasp the fish and move it forward as the spikes puncture the skin near the backbone. Thus indexed, the fish travels along the rail toward the cutter head.

As the backbone emerges through the center of the cutter-head, it is grasped by two revolving corrugated wheels which pull it through the cutter. Thus, there is no possibility of the spikes tearing the skin or flesh. At this point, the backbone is cored out, and at the same time, two circular knives cut the fish in half. The two loins drop on a twin-conveyor belt while the bones are flumed to the refuse bin.

Machine Removes Skin

Loins are then fed to the fourth machine—the fish skinner. Here, an operator places pairs of salmon loins on the feed plate, skin down, and positions them so that the tail-ends protrude over slots in the plate. A main cylinder is equipped with four sets of pneumatically operated clamps that protrude from the cylinder as it approaches the feed-plate slots. Next, the clamps close up on the ends of the loins as they move past the plate. Then, the clamps recede below the surface of the cylinder. The cylinder carries loins past a band-knife directly above the cylinder. And the knife, set for proper thickness of cut, removes the skin.

As the cylinder reaches a point adjacent to the two receiving conveyors, the clamps open and the skinned loins drop onto the belts. The cylinder continues to its lowest position, then compressed air blows the skins onto another conveyor that takes them to a station where they are barreled in a light brine. Meanwhile, the loins are conveyed past inspectors who remove any adhering skin. The loins now continue to the automatic filler.

Cut to Size and Canned

The fifth machine is the fish-filler. It actually comprises two units—a fish cutter and can filler. Originally designed for the conventional canned-salmon pack, this machine works equally well on the boned-skinned fish.

Loins placed two-deep on the feed chain of this machine travel to a series of circular knives that cut them into 1¾-in. pieces. The distance between each knife is 1¾ in.—equal to the height of a ½-lb. can. A machine of this type also cuts fish for No. 1 Tall cans. Variable speed transmission is employed.

Leaving the knives, the pieces are automatically fed into a bucket-chain conveyor that moves intermittently, one bucket at a time, each bucket indexed with the twist-tunnel on the filler unit. A rotary pusher fork shoves the fish out of the buckets and into the tunnel.

This fork is constructed so that pressure from the pieces of fish moving into the tunnel controls the speed of the transmission. In this manner, the aforesaid cutter automatically varies its speed, keeping the twist-tunnel full without too much pressure on the fish.

How Cans Are Filled

To enable proper filling into cans, the tunnel twists the fish cuts from the vertical to the horizontal position. At the exit end of the tunnel, a tumbler and a tumbler-fork force the cuts into a rotary measuring unit with compartments that are slightly smaller than the cans. After each compartment is filled, it closes and compresses the fish into a solid mass. When a compartment cannot take all the fish pressed into it, a stationary circular knife slices off the extra portion, which is then caught by the tumbler-fork and fed into the next compartment.

Cans now go to a dispenser that puts a measured amount of salt into them. Next, a chain conveyor takes the cans to a feed screw, which times them into a feed star. Here, the cans are fed to the can turret of the rotary-filling unit, directly below one of the compartments. Then a plunger forces the fish into the cans. At the same time, a vent knife moves down inside the can and permits air to escape as the plunger forces in the fish.

Now to the sixth machine—the weighing unit: After passing through a cold water spray under 80 psi., the cans enter the weighing machine, which consists of a number of individual scales. Cans that do not depress the scale to the proper level are transferred to a "light line" by a delayed-action ejector. In the case of the 1-lb. pack, a "light" can would be one weighing 15⅞ oz., or less. Enough fish is added by hand to correct the deficiency. The weighing machine, however, does not detect overweight cans. An inspector is charged with checking on the "overs."

The seventh machine is the curler clincher, that attaches tops, embossed with a code, to the cans. Rolled over the edge by the clincher, the top is put on tight enough to hold it in place, but not too tight to prevent the enclosed air from escaping into the vacuum machine.

Cans Vacuum-Sealed

Leaving the clincher, the cans are washed prior to entering a rotating valve on the vacuum machine—the eighth unit. The valve times the cans to go into the vacuum chamber without disturbing the vacuum. Here, under a vacuum of 25 in. (which produces a 12-in. vacuum in a 1-lb. can), the cans are hermetically sealed. Should the vacuum in the chamber fall below 18 in., the machine automatically shuts off.

Speeds of the machines progressively increase along the line—from 247 cans a minute in the filler to 250 in the weigher, 252 in the clincher and 255 in the vacuum sealer. Thus, if a belt slips, the higher velocities of the machines farther along the line are usually sufficient to prevent jam-ups. Two lines operate independently, each with a 25-hp. main-drive motor.

From the vacuum seamer, the cans go through another spray-washer to the cooler. Next, they are loaded on trays and piled six layers high. Then, they are taken by lift truck to the retorts—the final unit.

A cooking temperature of 242 deg. F., at 14 psi., is attained in 20 min. This temperature is automatically maintained for 1½ hr., after which the temperature is lowered in another 20 min. Cans are air- or water-cooled to 100 deg. F. before they are cased.

Consistent top quality here?

Not if this is permitted

Here's a Sure-Fire Guide For Spotting Plant Pests

Using this thorough check-plan, the baker—or any other processor—can quickly block infestation and thus promote utmost cleanliness in his plant

J. V. BLANKMEYER
Industrial Sanitation Counselors
Louisville, Ky.

CONCLUDING PART II

All food processing equipment—especially those units with "dead spots" where materials accumulate—and also certain specific plant areas commonly offer harborage and breeding places for vermin, unless careful cleaning practices are employed.

The system for making such proper checks is readily adapted for use in any plant. For illustrative purposes, we here apply it to a typical bakery. Every food working unit is a lure for pests, and in this case the following pieces of equipment are "on the list": Flour blenders and sifters, mixers, fermenters, dividers, rounders, molders, proofers, ovens, coolers, bread slicers, wrappers, and the cake shop machines.

Areas in and about the bakery that particularly invite insects and rodents are rooms opening to the outside, shipping docks, maintenance shops, garages, and vulnerable spots on the plant grounds.

Paraphernalia to aid you in making inspections were detailed last month in Part I of this article, along with pertinent points on the general principles to follow, importance of the "white line" in facilitating location and eradication of infestation, and methods of checking storage areas and flour shipments. We will now consider the inspection of specific equipment and critical areas.

Look Into Flour-Handling Units

One of the key spots is the flour-blending area. You should take several samples from the blender and the dump bins. Get them from the corners and dead spots in the equipment with the long-handled spoon. Sift them carefully.

If insects are present, check: (1) Condition of incoming flour, and cars in which they were shipped, (2) method and thoroughness of cleaning, and (3) frequency of spot fumigation of flour-handling equipment.

A number of bakeries have found it profitable to install sifters with 50-mesh screens between blender and flour-storage bin to ascertain quality of the incoming flour. Some bakeries even use a small sifter for sampling flour from a representative number of incoming sacks. All dusting flour also goes through this sifter. Frequent checks of the tailing box of such sifters readily show the condition of the flour. And this sifter will prevent contamination of flour-storage bins and elevators by trapping insects and larvae before they enter the rest of the flour-handing equipment.

Bins should be thoroughly checked. Take samples from the corners and repeat the sifting process. An examination of the waste materials from the dust collector or sack cleaner may likewise reveal pests. It is often advisable to sift this waste, as well as the floor sweepings from the area. Move sacks or cartons that may be present. Insects are likely to be found around them.

Follow the same procedure with

flour elevators, taking samples for sifting from elevator boots, legs and tailing boxes. Check the edges of the clean-out doors, particularly if the elevators are made of wood rather than metal. Dead spots at the ends of screw conveyors and also at the bottom and sides may likewise show infestation. Do not overlook the outer surfaces of the flour-handling equipment. Often, the upper surfaces are neglected during cleaning. Flour then accumulates, breeding insects. Likewise, the floor-scale pit may be infested.

Checking the Mixing Room

Mixers, mixing dock and adjacent equipment must be examined. Special attention should be given to dead spaces under the dock and the backs, sides, and bases of the mixers. The area around the sink is particularly attractive to roaches, so keep a sharp eye. Examine water pipes to the mixers for slime. Look carefully at the edges of the gear boxes. Beetles often may be found in large switch boxes common to mixing areas.

The inside of the overhead worm conveyor to the scales is another place to check. Also look inside the bolting reel or sifter, flour chute above the scales, and scale hopper. Investigate equipment such as the yeast emulsifier, pots and pans.

As a general rule, fermentation rooms are favorable sites for infestation and growth of molds. Roaches, flour beetles and molds are often found there. Check white line areas first, then the air conditioning unit and base, ducts, grilles, troughs (sides, ends, and wheels), and dough chute. Make a thorough inspection of the area between the false ceiling and the roof (almost every fermentation room has one), for this is usually a real trouble spot.

Take Stock of Make-Up Room

Machinery in the make-up department—although it may vary with the bakery—presents the same general problems. Each piece of equipment should be checked—inside corners, ledges, bases and belts. Look beneath the bases of dividers, rounders, molders, sheeters, cabinets, and merry-go-rounds.

Frequently, canvas belts on machines harbor insects. Be sure to look underneath belts, around the pulleys on each end of the machine, and along the edges of the track on which the belts move. Beetles breed in old dirty canvas belts on stored machinery. Also, dig into corners of all sifter pans or bins, particularly on the corn-meal machine.

Pallets and the corn-meal storage trough or bin should be painstakingly inspected, for beetles seem to develop at an extremely high rate in corn meal —probably because it cannot be sifted through a fine screen like most flours. Unless these areas are thoroughly cleaned and fresh corn meal is supplied each week or oftener, infestation will almost inevitably result.

Make-up tables and benches should also be inspected, with attention to every crack and crevice and into every corner of the trucks and racks. Even wheels should be examined, as well as the corners and the bottom of wooden trucks.

Watch the proofer, too. Whether it is of the overhead horizontal or vertical type, it will have doors, ledges and many corners—any one of which may harbor insects. Often, infestation is found on the edges of the door frames, at the base of the loader, on top of the proofer, under the canvas belting, and in corners of ledges. The insects may also breed on the small platform supporting the motor, where flour frequently accumulates due to careless cleaning. Rodent tracks, larvae, adult insects, or all three, may be found.

The proof box offers ideal living conditions for roaches and silverfish. Roaches may often be found inside the box, under plates or boards in the floor, or even on top of the box. Silverfish or firebrats may also inhabit the top of the box and the space around the air-conditioning unit. Some proof boxes have a dead air space beneath the top and the ceiling, usually accessible through a trap door. Don't overlook it. You may be surprised at what your flashlight beam will show. Even mice have been found inhabiting such areas.

The ovens in the bake shop offer ideal living conditions for firebrats. Check the tops and sides of the ovens and the areas beneath the shrouding at the base. Any ovens not in use should be checked inside and out.

Our typical plant has a large bread cooler. Baseboard areas, outside and in, as well as the top of the cooler and the air-conditioning unit usually found there, represent potential harborages for insects.

Scrutinize the Cake Shop

In most bakeries, cake-making ingredients are the most difficult to handle. Spillage is an immediate problem because batters are thin and fillings are sticky. A thorough inspection of the ingredient-and-mixing room is imperative, for spilled material will flow under the skids and bases of mixers and under and behind sinks. Some ingredients will even splatter on the walls. This spilled and splattered material lures pests. Even bees, attracted by the sugar, will invade this area if it is not properly screened.

Every crack or hole in the floor, bases of all stationary equipment, areas around the pan washer and sink represent potential harborages. If there is a short flight of steps from the mixing dock to the operating floor, check it thoroughly. It is usually removable, but often it is neglected. Examine the base of the steps, as well as the area under the dock. Inspect the outsides of wrapping, icing, and mixing machines to see that they are clean and free from any accumulation.

Those Open-to-Outside Areas

Now for more details on areas opening to the outside: The distribution room is one of these areas. Here, doors onto a loading dock may remain open for several hours. Insects as well as rodents may enter the plant through this area. They may be brought into the plant with returned cartons, which are often stacked on the dock.

Examination of the white line usually will indicate the presence of pests. Look then at the wrapping and slicing machines. If crumbs are allowed to gather, insects will breed in cracks, crevices, corners, and around the bases of these units. Racks likewise may become infested if not cared for properly.

Garages also invite pests. In addition to the entry afforded by open garage doors, any spillage onto the dock attracts pests. Infestation should be barred here before it has time to spread into the plant.

Maintenance shops frequently open to the outside and permit pests to enter. Although these areas, of necessity, cannot maintain the high sanitation levels indicated for the rest of the plant, they can be kept clean and orderly.

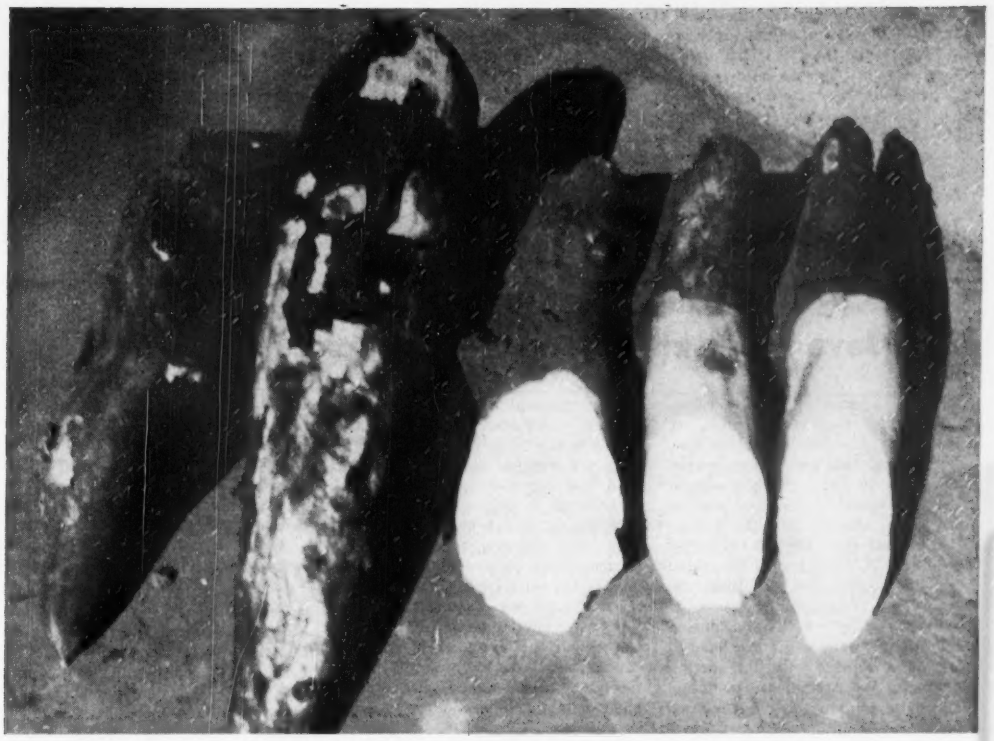
Tools and equipment bins can be arranged to reduce harborages, miscellaneous pipe sections can be stored in a rack off the floor. Check the space beneath cabinets to find out if there is enough room to permit cleaning. Otherwise, this area is likely to be inhabited. Maintenance shop areas are often shut off from the rest of the plant by a rodent-proofed screen door with a strong spring or snap lock.

Waste handling has an important bearing on pest control. The waste chute may become a trouble spot if it is not frequently cleaned. Examination of outgoing waste materials, such as floor sweepings, old corn meal, and the like, may reveal infestation that might otherwise be overlooked. Determine where such sweepings came from and watch for further evidence when that area is re-inspected.

"Outside Insurance"

Garbage areas outside the bakery, if not properly screened and handled

(*Turn to page* 172)



TUBEROUS ROOT of a tall, lightly foliaged plant that masquerades under a host of names is the source of tapioca.

This 10-Test Plan Clinched Tapioca Quality

Using laboratory-developed yardstick, Brazilian producers now screen out non-reliable material, thus assuring a dependable, high-grade supply

C. W. KAUFMAN
General Foods Corp., New York

When our corporation—General Foods—turned to Brazil for a dependable source of tapioca it was discovered that, although the supply was ample, variations in quality were such that we had to set up a special ten-test specification for the guidance of our Brazilian producers.

In developing this yardstick, our research department attempted to make the measurements as objective as possible. In doing this, it drew largely upon the general specification developed by the Tapioca Institute and upon our own 50 years of experience in the tapioca flour processing industry.

The measurements—still tentative, even though in effect for more than two years—comprise the following "ten commandments":

1 **Mesh Size.** The tapioca flour shall be of such particle size that 99 percent will pass through a 140-mesh screen.

2 **Uniformity of Lot.** The flour must be compared for uniformity of color and speckiness by setting out samples from the various bags (approximately one teaspoonful from each) in a row, close enough so they will touch one another when a piece of plate glass is pressed down upon them.

When separate bag samples of a single lot are then compared under good light, color should be the same in all component parts. When too many (more than 10 percent) of the samples are darker or have more specks than the rest, the lot is considered non-uniform.

3 **Odor.** The cooked starch must have a clean, fresh odor, free from any musty, earthy, rancid, or other foreign characteristic.

4 **Moisture Content** of tapioca flour as shipped should fall within the range of 10 to 13.5 percent. Water content of less than 10 percent would indicate severe drying conditions. Such products also present a possible explosion hazard. A reading above 13.5 percent moisture indicates a rather poor drying job and/or poor storage in locales of very high humidity, with the danger of subsequent mold contamination.

5 **Ash Content** of the tapioca flour should not be greater than 0.2 percent. It is determined by incinerating a well-mixed 3-to 5g. sample in a furnace at approximately 550 deg. C. until a light gray ash results. Next, this ash is cooled in a desiccator and weighed when room temperature is attained.

6 Color. To prepare an acceptable product, the tapioca flour must be very clean and free from pigment. Dirt causes an orange or yellow color, while iron-tannin combinations may cause a gray discoloration. The condition of the flour with respect to dirt and iron contamination can be ascertained by a simple cooked-color test.

To make the test, 8g. of air-dried starch are weighed out and then 10 ml. of distilled water are added. This is mixed to a homogeneous slurry and poured into a Pyrex test tube (16mm. in dia. x 150 mm. long). Now, the test tube is placed in a vigorously boiling water bath at sufficient depth to completely submerge the slurry. Boiled for 3 min., it is removed and allowed to cool to room temperature. Immediately upon cooling, the white stick is compared with color blocks in the Maerz and Paul *Dictionary of Color*. The lowest acceptable color for tapioca starch is indicated by Block 9-B-1.

7 Foreign Contamination. The method used for detecting foreign contamination is based on gelatinization of the starch by dilute alkali to yield a clear gel, with degree of color and clarity depending upon the amount of pigment, dirt and protein present. This method will be found useful in the plant for testing for foreign contamination at various stages of starch

From Java to Brazil—A Ten Year "Tapioca Odyssey"

Although a native to Brazil and Central America, tapioca — manioc, as it is known there—like the rubber tree, was taken to the East Indies where, particularly in Java, the tropical climate was found to be ideal for its cultivation. And in 1939, the last so-called normal year, the U.S. imported 382,000,000 lb. of high quality tapioca from Java. However, in 1942, the supply from that country was completely cut off by the war and, during the hostilities, our laboratories started work on a tapioca substitute or replacement. We were able to maintain a product on the market prepared from domestic grain sorghum, which had many of the qualities of tapioca.

Such was the status of the tapioca food industry in late 1946. The substitutes were not doing well, the Javanese situation still appeared quite hopeless, and the small quantities of material available from a San Domingo plant were unsatisfactory. Therefore, our management asked the research department to investigate the Brazilian situation, with the object of formulating a program of mutual cooperation and assistance.

The initial survey, made early in 1947, established the fact that manioc was grown on a vast scale in practically the entire country—10,000,000 metric tons of the roots were harvested in 1944. But, in most areas, it was used for domestic food supplies. Two areas were found, however, where large quantities of tapioca flour were made.

Sao Paulo Large Producer

The greater proportion of high-quality flour originated in the progressive state of Sao Paulo. Here, the mills are modern and equipped with potato processing machinery, primarily of German design. In a number of cases, the mills were capable of producing from 2,000 to 5,000 tons of finished starch per year, and they have pre-treated water supplies.

Raw material is grown in large acreage, harvested promptly, and hauled to the factory while fresh. The roots are washed, peeled, and ground in a hammer mill. Ground pulp is transferred to semi-cylindrical sieves equipped with flat brushes (see Sao Paulo flow diagram, top right). The brushes work pulp against the sieve and, at the same time, move it toward the discharge end. During this operation, water is sprayed on the pulp and leaches out the starch as "milk". Recovered milk flows to vibrating screens, then to starch tables. These tables, and the tabling operation, are similar to those used in the U.S. for recovery of potato starch.

Starch cake is transferred from the tables to vitreous lined tanks, where it is reslurried several times, then allowed to settle. Starch from the last settling is dewatered in a basket type centrifuge, then ground and dried under a vacuum at a temperature not exceeding 140 deg. F. Dried starch is ground, screened and bagged for shipment.

Santa Catarina Mills Small

The other starch producing area is broadly identified as the state of Santa Catarina—largely settled by Germans who brought many trade secrets with them. Here, the mills are small family units, and their production technics vary. Individual plots are small, but the total production in this area is quite large.

First steps in the process—washing, peeling and grinding—are similar to those in the Sao Paulo operation. But the slurry from the grinder flows directly to a vibrating screen, and the pulp from the screen is reslurried and returned to the screen several times. The milk is run into a large settling basin, designed to take the plant's production for a 24 hr. period.

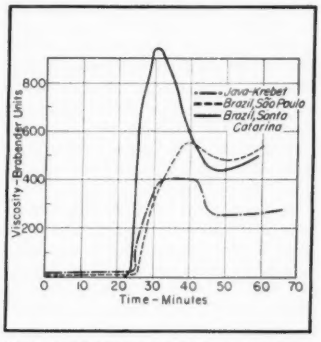
Settled starch is surface-washed with clean water, dug out, and placed on small trays having wooden frames and canvas bottoms. These are loaded onto portable trucks and pushed into hot rooms maintained between 110 and 120 deg. F. (see lower flowsheet). Finished starch is packed into bags for shipment, usually without further grinding or screening.

Action—And Unexpected Developments

As a result of the survey, our research department felt that Brazil could be converted into a useful source of tapioca starch, and our management decided to go ahead with the project.

It was evident from our early inspections that the poor opinion of Brazilian starch was brought about by the following factors: (1) Much of the Santa Catarina flour lost its original factory designation through consolidation and intermingling with products of other plants in warehouses and aboard ship, and (2) Plant conditions were bad—poor sanitation, poor water, delay in handling roots from field to plant, and lack of sufficient inspection, control and supervision.

In addition, two other problems have developed that were not originally anticipated—lower yield of starch from



AMYLOGRAPH CURVES. They show why Javanese tapioca was preferred by processors, also enable the laboratory to distinguish between Brazilian products from different states.

production, but should never be used as a measure of color.

In making the test, lg. of air-dried starch is transferred to a small beaker, 5 ml. distilled water is added, and the mixture is stirred. Then this slurry is added to 5 ml. 0.75 N NaOH in an 18 x 150 mm. test tube. Uniform gelatinization should take place in about 30 sec.

The gelatinized starch is inspected very carefully for dirt, bran specks, and other foreign matter, as well as for excessive protein contamination.

8 pH Determination. This check is made on the filtrate from a 10 percent slurry of starch and distilled water, using either a potentiometer or LaMotte, Taylor, or similar test sets employing the following indicators:

pH Range	Indicator
3.8–5.4	Bromcresol green
5.2–6.8	Chlorphenol red
6.0–7.6	Bromthymoi blue

The desirable pH should be considered as between 4.7 and 5.3. However, it can be as low as 4.5 or as high as 7.0 without indicating poor quality.

9 Viscosities on both a cold stareh slurry and cooked starch paste are important in evaluating the characteristics of starch for making our product, Minute Tapioca. The amount of damage to starch cells by excessive and improper drying, or by mechanical damage, is reflected directly by increased viscosity on a cold water slurry

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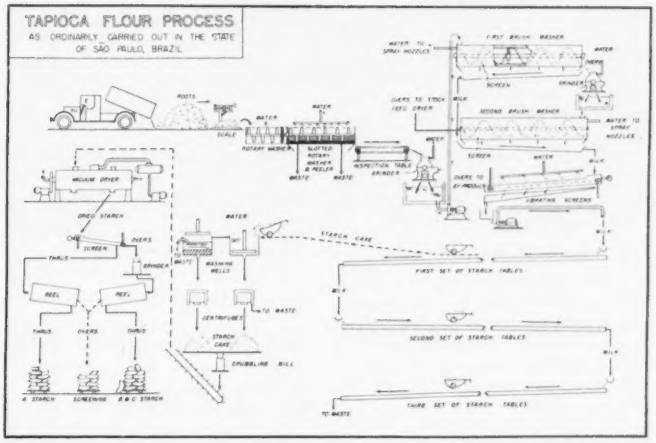
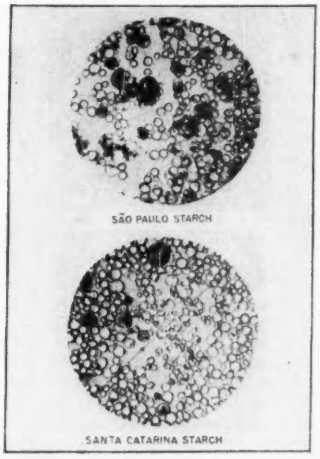
roots in the Sao Paulo mills (16 percent), as compared with output from roots in the Santa Catarina mills (20-22 percent), and difference in gelatinization curves of the two products (see chart).

Our investigations have shown that the variety of root in each area is quite different, but experiments indicate that differences in the starches cannot be attributed to the variety of root. Present indications are that the variations in the yield and gelatinization are attributable to differences in processing in the two areas.

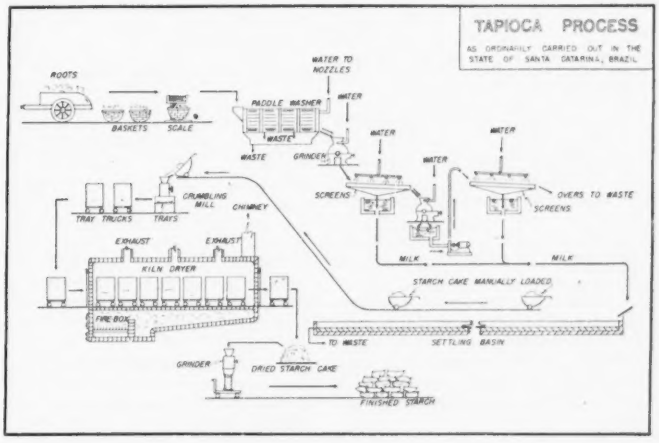
As for the recovered product, Santa Catarina starch contains many more small granules than the Sao Paulo product (see photo below), probably due to the settling basin technic used in the former mills. Starch tables, used in Sao Paulo mills, produced lower yields, but supply a greater percentage of larger granules.

Brazilian Processes Compared





PHOTOMICROGRAPHS show differences between starches produced in Sao Paulo and Santa Catarina. The latter contains many more small granules, probably due to variations in the processing technics employed by mills in the two areas.



TWO OPERATIONS diagrammed. In Sao Paulo (top) starch milk is tabled, then reslurried 3 to 5 times to further purify it. It is dewatered in basket-type centrifuges, ground, vacuum dried, graded and packed in 50 to 60 kg. bags. In contrast, Santa Catarina mills (lower diagram) run entire day's production into huge settling basin. When starch settles, liquid is withdrawn, starch is filled into trays, then dried in wood-fired kiln. Dried product is ground and bagged for shipment. Much of this product is made into tapioca flakes.

made by mixing 100g. of starch with 100 ml. of water at 85 deg. F. and stirring for 5 min.

The length of time required to collect 100 ml. of this slurry, passing through an arbitrary orifice of 5 mm., is taken as the measure of viscosity. A value of 100 sec. for this passage has been set as the top limit of acceptability.

Viscosity of the cooked starch preparation is known to depend upon many conditions. At the present time, it appears that the Brabender Viscograph gives reasonably reliable information for predicting tapioca starch characteristics. The instrument records viscosity changes of a starch slurry as it is heated at a constant rate of 1.5 deg. C. per min. through the swell, rupture, and paste phases.

The temperature range used is 35 to 90 deg. C. On reaching 90 deg., cooling is begun—also at the standard rate of 1.5 deg. per min.—and the test is continued for an additional 15 min. Viscosity is recorded on the Brabender graph, the "Y" axis of which is graduated in 1 min. intervals, while the "X" axis is graduated in Brabender Units (B.U.) over a scale of 0 to 1,000.

Cooked Starch Viscosity

A 27g. sample of starch, dry weight basis, is mixed with 450 ml. distilled water and the slurry is poured into the cup of a Brabender Viscograph. The thermoregulator is set at 35 deg. C., all switches turned to "On", and the heating is begun.

Heating is continued until the starch suspension reaches 90 deg. C. Then the indicator is switched to the "D" position to start cooling, and the test is run for an additional 15 min. The solenoid valve switch controlling the water is kept at the "On" position during the entire recording period.

On the basis of present information and using a good Java-Krebet starch as a reference standard, the curve of a starch having a good hot viscosity should have the following characteristics:

1. Start of rise in viscosity when temperature of 60 to 63 deg. C. is reached.

2. Rise to be very rapid and leveling off at maximum viscosity to form a plateau lasting 10 to 15 min. before a drop is noted. Or, rapid rise for a fraction of the curve, followed by a gradual sloping toward maximum viscosity.

3. Maximum viscosity should be reached between the range of 73 to 87 deg. C. and should read at least 400 Brabender Units.

4. After maximum has been maintained as a plateau for 10 to 15 min. (Java), or has been attained by a gradual sloping line, a drop in viscosity upon cooling will be noted. A drop below 250 B. U. indicates a weak bodied flour. A drop of 50 percent or more of the total maximum viscosity is undesirable.

5. Starches which show a rapid rise to maximum viscosity followed by an immediate and rapid drop (usually occurring between 72 and 77 deg. C. with the formation of a sharp-peaked curve) will not be considered acceptable for our purposes. Similarly, the starches which have a moderately rapid rise to a high viscosity and a moderately rapid subsequent drop, forming a rounded-top curve approaching a sharp-peaked curve as previously described, are also unacceptable for our purposes, though on the borderline.

6. Also on the borderline of acceptability are starches whose amylogram curves show a gradual sloping toward a maximum viscosity which is numerically low (below 400 B.U.), followed by a leveling off that continues until a rise due to a cooling of the paste is noted.

■ "Application of this 10-test specification produced very interesting results. For instance, use of the amylograph technic enabled us to make—for the first time in our experience—a distinction between starches from various sources."

10 Sulphur Dioxide Content. Starches processed with SO_2 or $NaHSO_3$ should show not more than a trace of SO_2 when analyzed by the Monier-Williams Method for total sulphurous acid.*

Amylograph Curves Highly Valuable

Application of this 10-point specification produced some very interesting results. For instance, use of the amylograph technic enabled us to make—for the first time in our experience—a distinction between starches from various sources. Production experience had always indicated a preference for Javenese rather than other types of tapioca starches—and the amylograph curves provided the first clues to the reason for this preference.

Another interesting application of the amylograph technic for control purposes developed when it was found that one particular mill in Sao Paulo was producing a starch that behaved like a Santa Catarina starch in our processing operations—yet the amylograph curve for this particular starch corresponded very closely to the standard Sao Paulo curve. A further breakdown was therefore made, using the same variety roots to eliminate varietal differences.

The particular processing difficulty that we encountered could usually be associated with high results in the cold viscosity starch test, indicating excessive drying temperatures or damage to the starch cells from some cause during processing. Upon further investigation, it was found that the water in this particular plant was distinctly alkaline, that the drying operation was not under proper control, and that the millers were in the habit of grinding *all* the starch coming from the dryers.

Normally, starch passes from the dryers in a fine, powdery condition and contains a small amount of what the Brazilians call "corolla", a granular material which has undergone incipient gelatinization due to sticking to the tubes and sides of the dryer. Normal practice in the better mills is to screen out this corolla and put it into a lower grade of starch.

As a follow-up on these observations the filter cloth on the basket centrifuge was changed and a fresh one inserted. Continuous runs were then made until the cloth had to be changed again. Appearance of the centrifuge cake indicated an increasing moisture content with each lot, which in turn was associated with an increasing period of heat exposure in the batch dryer, and an increase in percent corolla. Final work has not been done toward establishing controlled moisture in the cake going to the dryer, or effect of lower drying temperatures as related to extended drying time.

It is obvious that operation within a rigid quality specification provides leads for investigations of considerable value to both the producer and user of tapioca starch. In this case, the benefits derived—from the technical program at (1) the producing point, (2) the research laboratory in this country, and (3) the point of use for reprocessing the flour—have contributed materially to our general knowledge of variations in the types of materials being delivered to the plant, and to our know-how in the handling of these materials at the factory.

Finally, this opportunity is taken to acknowledge the outstanding work of Lee Shipman, plant chemist Minute Tapioca Co., Orange, Mass., who has spent the last two years in Brazil; of Frank Hollis and others in his project group at Central Laboratories, General Foods Corp., Hoboken, N. J., for the more fundamental approaches which they have contributed; and of Geismar Cia. Ltda., Sao Paulo, Brazil, and its New York office for active cooperation and support.

*Methods of Analysis of the A.O.A.C., page 533, Section 32.32, Sixth Edition, 1945.

ON SCREENING PANEL, both civilian and military representatives evaluate Armed Forces' utilization of food products.

MEATS FOR THE MILITARY: 3 Ways We Can Help

Special industry studies, "pilot" work, and research cooperation called vital in assuring palatability and nutrition under severest conditions

BERTRAM W. GARDNER, JR.
Animal Products Branch, Q.M. Food & Container Institute for the Armed Forces, Chicago

Because meat is the foundation of the ration, every effort must be made to overcome its perishable nature and to retain its high degree of palatability.

Treatment required to make meat stable for military conditions of use usually alters its original acceptability and may modify some of its nutritive qualities. Therefore, the major problem facing the meat industry is to devise technics that will minimize these changes. With this premise in mind, let us now examine factors related to specific Armed Forces problems.

Two major considerations are: (1) Production, and (2) utilization of the meat products. With production, whether it be for the civilian consumer or the military consumer, the source of raw material is important. Little can be done to change the relationship in the quantity and quality of the different kinds of meat available. It is safe to say that any change will be the result of a long-time breeding and feeding program. This is not a serious handicap, because there are many processing changes that can be made before it becomes necessary to modify existing supplies of raw material.

Combat-Feeding Problems

Because meat is so highly valued in the military ration, it is the commodity chosen for detailed discussion in this second of a special series of articles on how the food industry can cooperate with the Quartermaster in peacetime research.

Last month, general problems in developing rations for the armed forces were discussed. Subsequent articles—all prepared by the Food & Container Institute—will consider the typical problems arising with other of these ration commodities that must be designed for any contingency.—The Editors

Manufacturing technics used in the production of meat products for the civilian consumer satisfy, for the most part, the requirements of the military consumer. However, certain modifications or changes must be considered in the light of the second important factor —military utilization. Within these modifications, a majority of the animal-products problems are found.

Conditions relating to the utilization of meat products for the military consumer are entirely different from those for the civilian consumer. These differences are detailed in Table I. In almost all instances, the military problems of utilization are much more difficult. This situation leads to the use of such products as dehydrated and compressed meat; frozen meat from which all the bones, connective tissue, and excess fat has been removed; and canned meats that are complete entities and are stable for long periods of time.

The need to save weight and space, the lack of refrigeration, and the long shelf life required are but a few of

Research Goes On From Here

TABLE I—These Factors Affect Meat Utilization

	Civilian	Military
1. Transportation and Storage	a. Little limit is placed on space and weight.	a. Space is always critical; tonnage is rigidly limited.
	b. Adequate manpower for handling is available.	b. Available civilian manpower and prisoners of war are of questionable quantity and quality; a soldier handling subsistence is lost to fighting front.
	c. Refrigeration is adequate.	c. Refrigeration is not available under combat conditions and very limited in supply line.
	d. Time to make deliveries is sufficient. Civilian pipe line of supply from plant to kitchen is short, as contrasted with that of military.	d. Food must follow *all* battle fronts; never enough time to get it through from processing plants.
	e. Shelf life of 30 to 90 days is usually all required.	e. To be sure of having food when needed, it must have a minimum shelf life of 270 to 365 days.
2. Purchase vs. Issue	a. Privilege of making selection is afforded and payment of cash supports decision.	a. Soldier has no alternative but to eat or go hungry; usually, little value is placed on that which necessitates no voluntary payment.
	b. Attractive containers and displays are used, and a high-powered advertising program stimulates desire.	b. Tactical conditions necessitate camouflage of containers. (Advertising consists of gripes and rumors.)
3. Consumption	a. Small quantity cooking in a modern kitchen is characteristic.	a. to c. Food is prepared and eaten under conditions such as mud of fox holes, confines of a submarine or aircraft, in icy blasts of Arctic. Under best of conditions, feeding is of institutional type.
	b. An affectionate specialist, the housewife, caters to the desires of the diner.	
	c. Pleasant comfortable surroundings where there is little interruption or distraction are usually found.	

TABLE II—Meat-Product Problems and Progress to Date

Commodity Field	Problem	Present Situation
Canned Meats (A)	*Modification of presently available canned meat items to eliminate canned meat flavor and texture. Storage life requirements are at least 6 mo. at 100 deg. F.*	Available products have an undesirable canned meat flavor and mushy texture, particularly noticeable in larger cans but also present in individual size packages. Fifteen of those items used in rations were considered good, 24 fair, and 7 not acceptable. Use of nonacceptable items and improvement of fair and good items depend upon development of new manufacturing procedures and modification of existing procedures with emphasis on those factors related to amount of heat treatment required for canned meats. Progress is being made by Activities Committee, Associates, Quartermaster Food & Container Institute, in obtaining information on vacuum used in manufacture of commercial canned meats.
Canned Meats (B)	*Development of acceptable canned meat items with a storage life of at least 6 mo. at 100 deg. F.*	Additional, as well as new formulas and methods of manufacture must be developed to make available sufficient variety of canned meat items to meet minimum requirements of Armed Forces. Sixty canned meat items are required to possess distinctly different flavor, texture and appearance characteristics; 20 of these are required for breakfast use. Available canned meat items can be grouped and listed as follows: Stews, meat and gravy, highly seasoned items, patties, meat and fruit, meat and cereals, meat and eggs, spreads, luncheon meat, steaks, and specialties such as chop suey and pork tongues. Although there are items somewhat closely associated by being in one of above groups, they are frequently distinct from other items in same group because of outstanding differences in flavor, texture, or appearance. Of 60 canned meat items required, approximately 25 are available and are sufficiently different to offer variety. Of 20 canned meat items required for breakfast use, 7 items are available. Activities Committee, Associates, Food & Container Institute, is making available commercial canned meat items for evaluation. Progress is being made in development of a chicken and gravy item, and improvement of beef and vegetables with gravy. Twenty-five canned meat specifications have been revised and coordinated with industry. These specifications now reflect latest improvements possible.
Canned Sterile Ham	*Development of an acceptable sterile canned ham with a storage life of 6 mo. at 100 deg. F.*	Canned sterile ham showing a minimum of heat damage is required. Mushy texture and undesirable canned meat flavor are major defects of all canned sterile hams produced to date. These defects result from excessive heat processing procedures.
Mild-flavored Ham and Bacon	*Provision of highly acceptable mild-flavored ham and bacon with storage life of 1 yr. at 70 deg. F.*	Products which will retain desirable flavor and texture characteristics without refrigeration are required. Available mild-flavored cured hams and bacon are subject to microbial and chemical deterioration unless refrigerated.
Dehydrated Meats	*Development of palatable dehydrated precooked meat products with storage life of at least 6 mo. at 100 deg. F.*	Dehydrated steaks, chops, hamburgers, and other varieties of meat products which will retain flavor, color, and texture comparable to fresh meats prepared in same manner, are required. Dehydrated corned beef hash and dehydrated meat and rice deteriorate within 3 to 4 mo. at 100 deg. F. They develop fishy and metallic flavors, meat turns black, and hard particles remain after reconstitution period of 10 min. A dehydrated meat bar has been developed, but its acceptability in field after storage is as yet unknown.
Canned Bacon	*Production of an acceptable canned bacon with storage life of at least 6 mo. at 100 deg. F.*	Extension of laboratory findings to large scale production is necessary. Canned sliced bacon has a high salt content (5 percent) which contributes to its stability, but also gives it low acceptability. Stability may be obtained with a low salt content (2½ percent) if a moisture-salt ratio of approximately 5 to 1 is maintained in finished product.
Maximum Temperature Registering Indicator for Frozen Meats	*Development of a device for indicating exposure of frozen meats to deleterious temperatures.*	A simple indicator which will permit recognition of exposure to thawing temperatures for significant periods is required. Indicator should be adaptable to precooked frozen meats and other frozen foods. Exposure of frozen meats to deleterious temperatures (approaching or exceeding thawing temperatures at which bacteria may propagate and multiply) may occur in transit or in storage, but may not be evident if products are refrozen Indicators based on growth of bacteria or upon melting of fat or wax compounds have been tried.
Frozen Lamb	*Provision of highly acceptably frozen ready-to-use consumer cuts of lamb, utilizing entire carcass.*	A prefabricated lamb product, consisting of chops, roasts and ground meat, would yield potential savings of more than 50 percent in space requirements, 25 percent in weight requirements, and partially solve skilled butcher problem. Detailed information for specification purposes is required.

(*Table II continued on page 55*)

Field	Problem	Present Situation
		Frozen telescoped lamb (hind legs inserted in chest cavity) offers a saving in space requirements during shipping and storage of approximately 40 percent over carcass lamb. Product does not provide an appreciable saving in shipping weight and is subject to further disadvantage that skilled butchers are required for satisfactory use.
Frozen Pork	*Provision of highly acceptable ready-to-use frozen pork chops, loin roast, and pork sausage with storage life of 1 yr. at 0 deg. F.*	Extension of storage life and adaptation of improved industrial prefabrication practices are required. Armed Forces are using frozen semiboneless pork loins with some success, but product is susceptible to rancidity after 6 mo. storage at 0 deg. F. More widespread usage is anticipated if storage life can be extended to at least 1 yr. at 0 deg. F. and if greater variety of pork products, such as: (1) pork loin roasts, (2) uniformly cut pork chops, and (3) pork sausage, can be supplied in prefabricated, ready-to-cook form.

TABLE III—Other Animal-Product Problems

Commodity Field	Problem	Present Situation
Prefabricated Frozen Turkey	*Provision of highly acceptable frozen ready-to-use consumer cuts of turkey, utilizing entire carcass*	Detailed information for specification purposes is required. Armed Forces are using frozen New York dressed turkeys, which are wasteful of shipping and storage space, weight, and time of kitchen personnel required for preparation. A saving of at least 50 percent of space and weight requirements and an even greater percentage of time required for preparation can be anticipated if a satisfactory prefabricated product is developed. Industry in now producing a prefabricated frozen turkey for civilian market which can be adapted for Armed Forces' use with a moderate amount of developmental effort.
Dehydrated Eggs	*Improvement of dehydrated eggs so that they will have optimum acceptability and stability under extreme military storage conditions.*	Dehydrated stabilised eggs have proven to have twice shelf-life of powdered eggs. Evaluation of results of experimental work conducted in industry and USDA on fermented dehydrated whole eggs is in progress. Regular manufacturing and storage studies on dehydrated stabilized eggs (acidified) have been completed, and a specification is being prepared.
Canned Sea Food Products	*Development of acceptable canned sea food products with storage life of at least 6 mo. at 100 deg. F.*	Increasing number of acceptable canned sea food items to supply variations in rations is required. Available canned sea food items are limited from standpoint of variety. Such items as salmon and tuna have been used in the rations. Some research has been done to extend source of raw material for these and other sea food items. Combination items utilizing sea food products have low acceptability.

the elements of the total problem encompassed in military utilization. As shown in Table I, these and other utilization factors necessitate modification of manufacturing technics, if meat products are to be adequate for operational use.

Turning now to possible methods by which the Armed Forces can be assisted in solving animal-products problems, there are three approaches. During the last war, when a majority of the meat processing facilities were occupied with production for Armed Forces use, industry devoted the greater part of its research facilities to the solution of those problems that were pressing. Now that the civilian consumer has once more assumed an important role, the meat processing industry must again devote nearly all of its resources to the solution of civilian utilization problems.

This does not mean that the Armed Forces will be deprived of adequate research facilities, *unless* the information obtained from industrial research is *not* made available for use in planning national defense.

1ST WAY

Here, then, we have the first method by which industry can assist: By making available new information obtained from research and by making available new products as well as improved old products which the Armed Forces can evaluate and adapt to meet military utilization characteristics.

An example of the mechanics of this method of assistance is found in the current program of evaluating canned meat items available on the civilian market. This project is being accomplished in cooperation with the Associates, Food & Container Institute. The Associates contacted industry with the request that samples be made available. The Quartermaster Food & Container Institute in turn evaluated the products from the standpoints of military utilization and the effect that military utilization might have on their production.

All products that show outstanding value from the military utilization viewpoint will be subjected to a "monotony test" to estimate their adaptability for use in the Arctic, in the tropics, or in any feeding situation where variety is essential.

2ND WAY

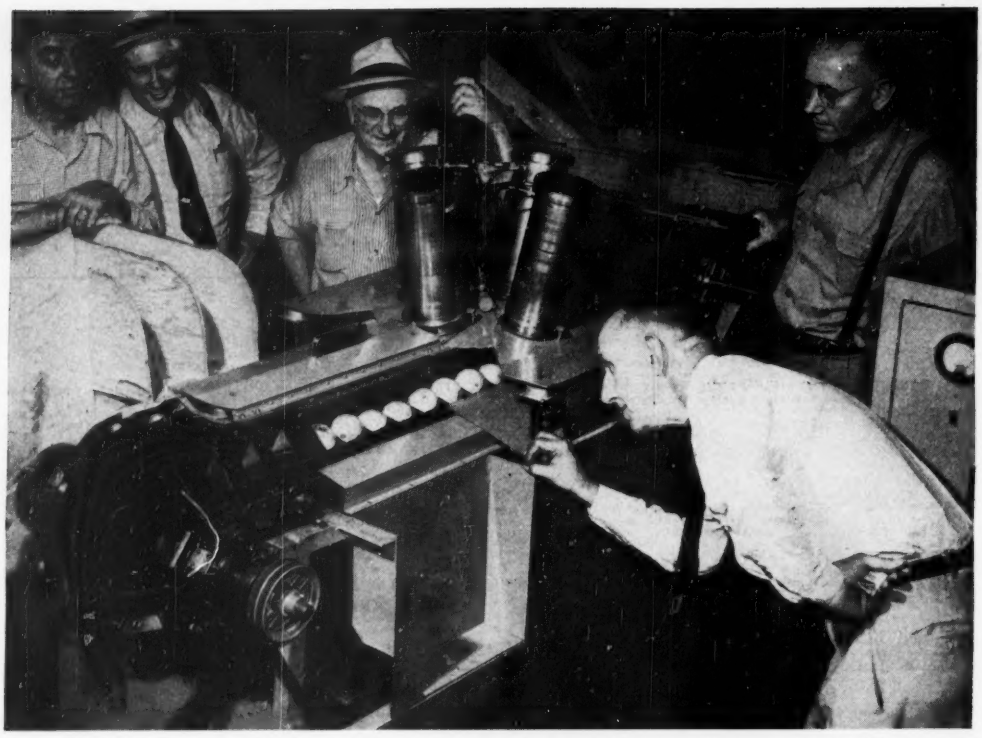
A second method of assisting in solving animal-products problems would comprise participation by the entire organization of each company in pilot-plant or large-scale production of items that require changes in manufacturing methods. Outstanding cooperation of different members of the meat industry, in using this method to get a solution to one or several aspects of specific problems—dehydrated eggs, frozen boneless beef, dehydrated meat —is indicative of the value of the method as a means of preparing for every possible defense emergency.

3RD WAY

A third method whereby the industry can contribute to national defense is by participation to the fullest extent possible in research of primary benefit to the military consumer. It is realized that the meat packing industry's first allegiance in time of peace is to the civilian consumer. However, some research problems are confined to the processes that are used in the meat manufacturing plants. Consequently, that fraction that can be diverted from the civilian consumer can best be utilized by application to pertinent national defense problems.

Specific problems resulting from the military utilization factors previously cited are presented in Table II. Assistance in these problems by the methods suggested in this article, or by any other method devised by the meat industry, will aid in defense.

In addition to the meat problems that have been discussed in some detail, there are other problems in the field of animal products. These problems are set forth in Table III. All of the facts concerning production and utilization characteristics of meat products are equally applicable to other animal products.



"SEE THROUGH" unit demonstrated its high speed and precision in trial orange-sorting runs at the California Fruit Exchange plant, Placentia, Calif. Here, close scrutiny of Exchange members reveals attention machine attracted.

Big Saving With New X-Ray Fruit Grader

Machine classifies oranges into six grades on basis of juice content—salvaging from 30 to 50 percent of frost-bitten fruit that was previously discarded

JAMES JOSEPH
Special Correspondent, "Food Industries"
Los Angeles

A new, fully automatic, X-ray orange grading machine has been successfully tested by the California Fruit Exchange at its Placentia, Calif., plant. This equipment not only detects frost-damaged oranges, but also separates all fruit into six quality classifications according to juice content.

It grades and sorts fruit at a rate of 10 per second—three times the speed of the original, manually operated ray machine which was introduced in 1937. Also, the manually operated machine required five or six workers, whereas this new model needs but one operator—and only in a standby capacity.

Use of the X-ray for detecting frost-bitten fruit is based on the principle that an orange which has not been frozen will stop more rays than one that has been damaged by low temperature. The juice cells of a frozen or frost-bitten orange become ruptured and, when the fruit is defrosted, the juice collects in the center section to later be re-absorbed by the tree. Oranges deprived of the greatest part of their juice are more easily penetrated by the X-rays. They also become lighter in weight and buoyant in water.

The most common method of separating frozen fruit from good oranges is that of flotation. Fruit are dumped into a rectangular tank of swiftly moving water and the frozen ones, being more buoyant, rise to the surface almost immediately. Rejected fruit is skimmed from the surface by one conveyor, while another, operating under the water, conveys the good fruit to the processing department, or to packing sheds.

This new equipment is sufficiently accurate to enable the processor to salvage from 30 to 50 percent of the oranges discarded by flotation grading. While perhaps not of proper quality to be packed as fresh oranges, such fruit still contains enough juice to be economically used as a source of canned and frozen juice.

Way It Works

Now for the details of the unit's action in grading the oranges by the amount of radiation passed through them: An orange, traveling in its cup-conveyor, enters the machine and is viewed by a photoelectric cell. This

cell adjusts the X-ray beams to compensate for larger, or other than normal size fruit. Larger oranges pass less radiation than small ones.

Compared With "Standard Opacity"

The orange passes under the beam of an X-ray unit—one of the two test units that "view" the fruit along each of the machine's two conveyor belts. One X-ray beam pierces the orange under inspection, while a second beam, alongside each test beam, goes through a "standard opacity"—a piece of material (aluminum in this case) which is equivalent to the opacity of a normal, good orange.

Then electrical currents, set up by each of these beams, are compared. That is, the current from the orange under test is compared with the current through the "standard opacity." The difference constitutes a measure of the grade of the orange under test—how much it deviates from the standard, normal orange.

The electrical current expressing the difference factor—varying according to the amount of frost-bite—enters an electrical network which actuates one of six different "flag" devices, or "memory mechanisms," attached to each cup in which the oranges travel. Each flag represents a grade of orange. The flag pushed out by the electronic action is called a "memory mechanism" because, when the cup bearing the tested orange continues down the conveyor, it is this flag which eventually trips the cup when it reaches the assigned grading chute.

Out They Go

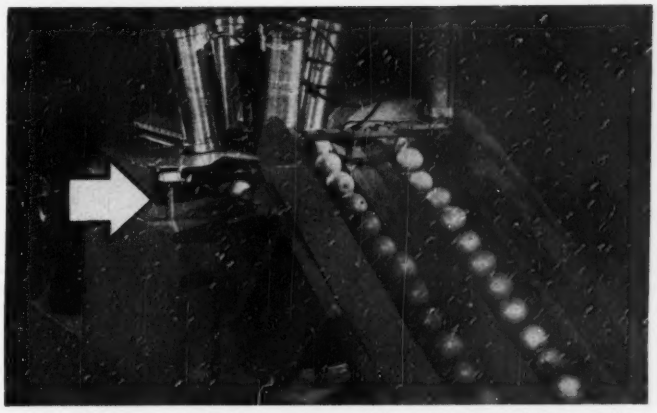
The flag releases a spring-actuated arm that holds the cup and its orange in a horizontal position. This causes the cup to turn up on its side, assuming a vertical position. And in so doing it ejects the orange in front of a baffle that directs it to the previously assigned grade-chute.

Tests conducted with this machine show that the oranges are ejected so gently that no bruising takes place.

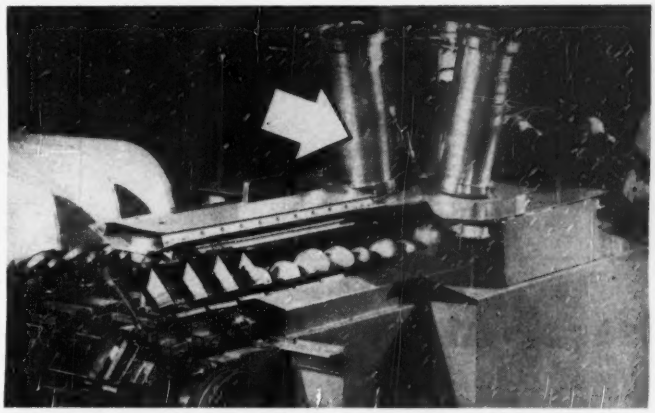
The X-raying and subsequent selection of the proper flag by the electromechanism system takes but 1/100 sec. The cups will accommodate oranges from 2⅛ to 3 in. in diameter (sizes 392 to 150), which comprise about 90 percent of the California crop. Machines can be built to handle fruit of desired size.

The grading unit is built by Automatic X-Ray Corp., Los Angeles. Visioned for the future is a similar machine which will sort fruit according to size, color, or granulation. The company believes that it is possible to incorporate these three functions in a single, automatic machine that will operate at high-speed.

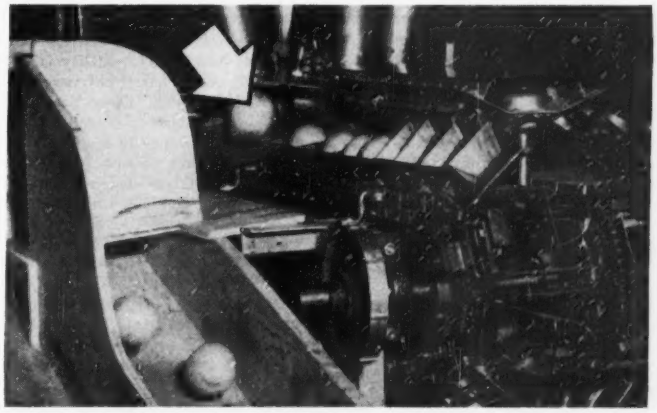
This Is How It's Done



1 **ORANGES** move up flight conveyors and drop into cups that carry them past photoelectric cells (arrow) which adjust the X-rays for size of fruit.

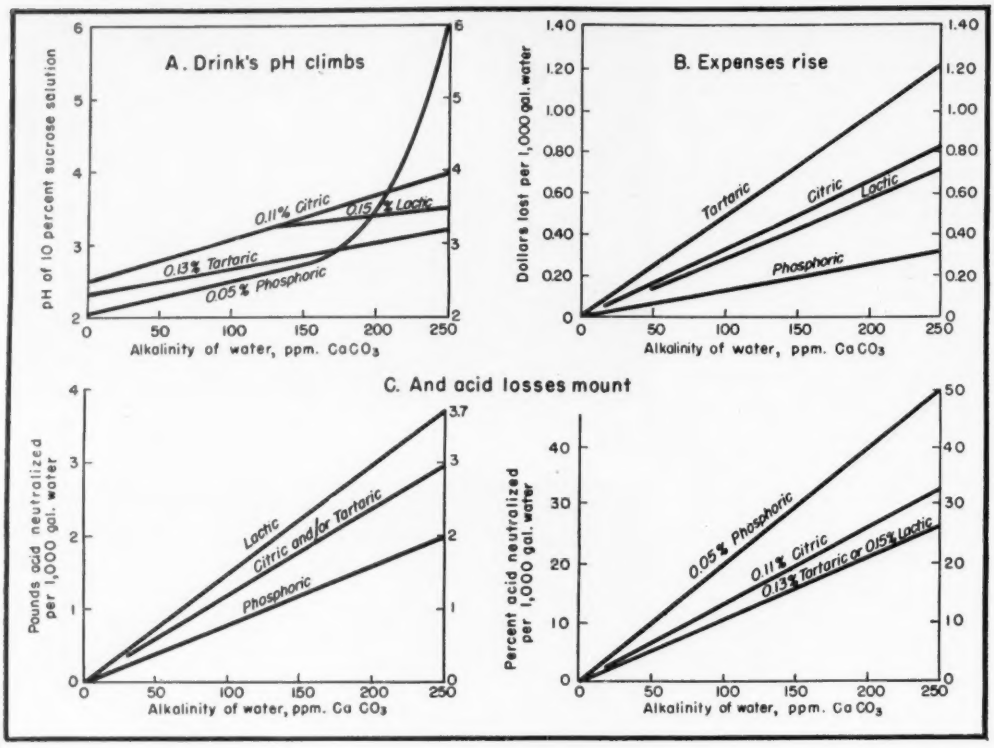


2 **THEY** now pass X-ray units (arrow), and an impulse, varied by fruit's ray permeability, "sets" one of the six grading-"flag" devices on each cup.



3 **THEN** when cup reaches assigned chute, specific flag trips corresponding spring-actuated arm, cup flips up, and orange (arrow) rolls into chute.

Curves Show the Troubles When the Water Isn't Soft



Hard Water Costs the Bottler Plenty

— because it requires up to 20 percent more acid in soft drinks, also creates off-flavors and poor color. But there's a fool-proof solution to the trouble

MICHAEL SIVETZ
Chemist-Engineer,
Argonne National Laboratory, Chicago

A re-evaluation of beverage water sources, uses, and resulting drink palatabiiities and saleabilities, can reveal monetary savings and standardized product control features not heretofore applied.

For, the effect of even a slight amount of hardness in the water used in a soft drink is reflected moneywise in the increased quantity of food acid needed to produce the desired tartness. And buffer salts, resulting from this neutralization, frequently affect the taste and appearance of the beverage, and consumer acceptance of it.

Independent and franchise soft beverage syrup makers and manufacturing bottlers have plants in many cities, states and countries in order to provide effective local distribution. And standardization of quality is essential in brand name beverages to assure uniformity of flavor at every location. Franchise specifications require strict adherence to standards of syrup preparation, aliquots per bottle, carbonation, filling heights, bottle volumes, filling technics, sanitary procedures, and filling water that is bacteria-free and acceptable for drinking.

Mineral Content Variable

Although the recommended filling water may be clear, colorless and free from pathogenic organisms, it usually contains many types of dissolved minerals, representing all degrees of salinity, hardness and alkalinity found in nature.

In cases of extremely poor bottling waters, franchise organizations strongly recommend chlorination, coagulation, lime treating and filtering of raw or municipal water supplies. Not all of these technics are applied, and frequently only one is used. Altogether, considerable differences exist in the mineral contents of waters used for a single trade-marked beverage in different localities. These differences are usually small, but there are many instances where they affect the beverage taste and appearance.

For example, one who travels across the United States usually observes that "Brand A" soft beverage tastes differently in New England from what it does in the Midwest. And differently again in the Far West and the South. These taste differences are due, for the most part, to variations in mineral contents of local waters.

Central laboratories for franchise bottlers have known for a decade that demineralization of water would solve this problem. But they have retreated from it, because of over-apprehension concerning the cost and operational complexities involved. Since sulphuric or hydrochloric acids, and sodium carbonate or caustic soda, are used for cation and anion regenerants, respectively, it was feared that these compounds might, through the carelessness of the busy and untrained bottling operator, be carried over into the beverage. Then, too, there was worry about free mineral acid released after the cations are removed from the natural constituents of the water.

Costs Examined

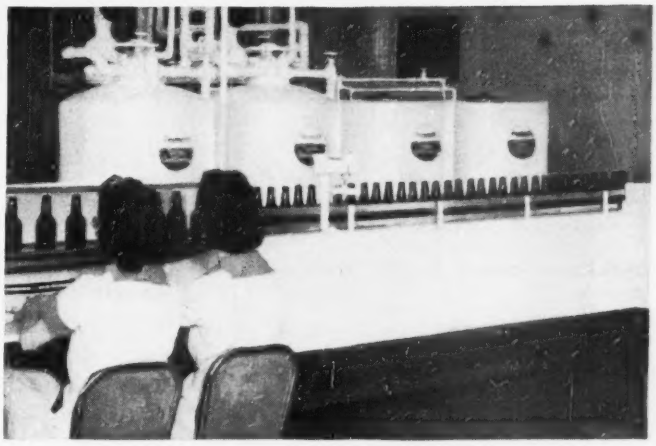
But since these obstacles have been overcome in other industries, they can be avoided in the soft beverage industry, with a consequent improvement in water quality at an overall decreased cost. One may ask, "How much does beverage water cost?" The answer to this question goes deeper than the bill paid to the supplier or municipality. All told, it is made up of the following three factors:

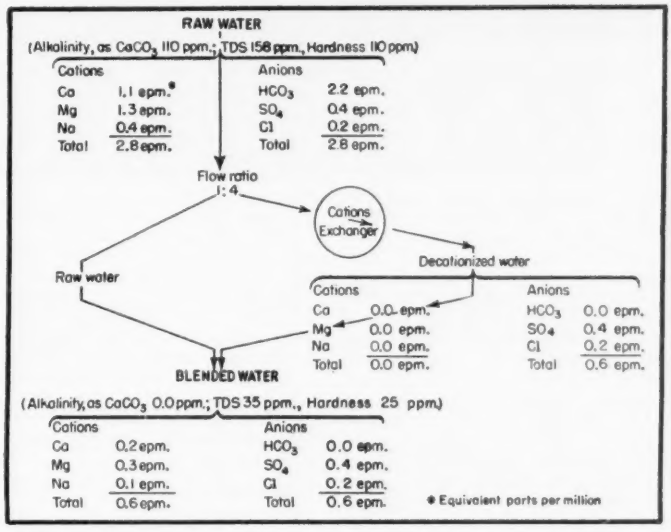
1. *Municipal water rates.* These run to 40c., perhaps more, per 1,000 gals., depending on local services and circumstances. Privately owned wells, or wholesale sources, at times deliver water as cheaply as 10c. per 1,000 gal.

2. *Neutralization of food acids.* The alkalinity in the water can cause appreciable acid losses (as is shown in Table I, which gives data on four beverage acids used with various alkaline waters). For example, alkaline water of 100 ppm. as $CaCO_3$ is not generally considered very hard, yet 1,000 gal. of it can neutralize 34c. worth of citric acid. Further loss in acidity results from the buffering action of acid salts that are formed by this neutralization.

3. *Decrease in sales due to off-flavor.* In case of universally distributed franchise soft beverages this is incalculable, but it is certainly a very positive, significant—and recoverable—loss.

Blending Often Solves the Problem





EFFLUENT from cation exchangers (photo, top) may be blended with raw water to give satisfactory beverage water. Flow sheet (above) shows such an operation using raw well water. Here, four parts of decationized water are blended with one part of raw water to give zero alkalinity and low hardness. (Photo courtesy Permutit Co.)

Soap Losses in Hard Waters

It has long been realized that soap losses in hard waters constitute an appreciable dollar loss. Using 1,000 gal. of water as a basis, 1 ppm. hardness as $CaCO_3$ is equivalent to 3.85g. $CaCO_3$, 1.6g. Ca. or 1g Mg.

To reduce the hardness of 1,000 gal. of water containing 1 ppm. as $CaCO_3$, 1/18.5 lb. sodium stearate will be required (theoretically). Actual home surveys indicate the consumption of 1/5 lb. soap per 1,000 gal. of such water. This is explained by the fact that soap usually has a filler or bulk in its content—made up of many fatty acids. The following tabulation, showing the dollar and pound loss on soap in various hard waters, is calculated at the mean of 0.1 lb. of soap (at 20c. per lb.) per 1,000 gal. of water.

Hardness Ppm. $CaCO_3$	Loss Per 1,000 Gal. Water	
	Lb. Soap	Dollars
0	0	0
50	5	1
100	10	2
150	15	3
200	20	4
250	25	5

So it is readily seen that even a so-called soft or lime-treated water, of 50 ppm. as $CaCO_3$ hardness, will cost a user $1 per 1,000 gal. Compared to the cost of softening, or to the original cost of the water supplied, this is a factor running about five-fold in hidden expense.

Acid Losses in Hard Waters

The dollar loss on soap is more universally recognized than the food and soft beverage acid dollar loss due to alkaline waters. Alkalinity of many waters is contributed by its natural hardness, expressed as ppm. $CaCO_3$.

Acids Are Wasted When Water Is Hard . . . What Regenerants Cost

TABLE I—HARDNESS CONSUMES Varying Amounts of the Four Acids Used in Soft Drinks

Ml. 0.02N NaOH in 200g. Beverage	Alkalinity Ppm. $CaCO_3$	Acids Neutralized Per 1,000 Gal. of Water															
		Phosphoric, 0.05 Percent				Tartaric, 0.13 Percent				Citric, 0.11 Percent				Lactic, 0.15 Percent			
		Lb.	Cost at 17c. Lb.	Per-cent	pH at 20C.	Lb.	Cost at 38c. Lb.	Per-cent	pH at 20C	Lb.	Cost at 28c. Lb.	Per-cent	pH at 20C	Lb.	Cost at 20c. Lb.	Per-cent	pH at 20C
0	0	0	0	0	2.05	0	0	0	2.30	0	0	0	2.50	0	0	0	2.55
1	50	0.4	7	10	2.25	0.6	25	5.5	2.50	0.6	17	6.6	2.82	0.7	14	5.4	2.80
2	100	0.8	14	20	2.45	1.3	50	11.0	2.70	1.2	34	13.3	3.10	1.5	30	10.8	3.10
3	150	1.2	21	30	2.70	1.9	75	16.5	2.85	1.8	50	20.0	3.35	2.2	44	16.2	3.30
4	200	1.6	28	40	3.25	2.5	100	22.0	3.05	2.4	68	26.6	3.70	3.0	60	21.6	3.40
5	250	2.0	35	50	6.10	3.1	125	27.5	3.20	3.0	84	33.0	4.00	3.7	74	27.0	3.55
>5*	....	4.2	71	100	....	11.0	420	100.0	....	9.3	260	100.0	....	13.0	260	100.0	.....

* When sufficient NaOH is present to neutralize the total acid.

TABLE II—CHEMICAL REGENERANTS and Their Costs

Unit	Resin Capacity, Grains Per Cu. Ft.	Resin Cost, Dollars Per Cu. Ft.	Quantity of Regenerant, Lb. Per Cu. Ft.	Chemical Costs	
				Cents Per Lb.	Cents Per Gr./1,000 Gals.
Decationizer	8,000	15	2.0 H_2SO_4	1.5	0.375
Deanionizer	10,000	35	2.2 Na_2CO_3	3.0	0.66
Highly basic deanionizer*	6,000	60	4.0 NaOH	3.0	2.00

* For silica removal only.

Using 1,000 gal. as a basis, Table I and the curves at the beginning of the article illustrate, at acid percentages normally used in soft drinks, the neutralization caused by various alkaline waters. The pH values on the graphs are not absolute but are sufficiently accurate to be useful in expressing this problem.

Of more significance than pH change are the pounds of beverage acid neutralized and the corresponding dollar loss. Since the mineral acid, phosphoric, is used in soft drinks in lower concentrations than tartaric, citric or lactic to obtain the same pH, and since it is less costly than these organic acids, the monetary loss is not as great. Effect of alkaline waters upon the taste of drinks containing phosphoric acid is greater, however.

A 100 ppm., as $CaCO_3$, alkaline water neutralizes 20 to 25 percent of the phosphoric acid present in typical cola beverages. This significantly and detectably alters its tasteable tartness. A beverage prepared from an organic acid will only have 10 to 15 percent of its acid neutralized, because these acids, although they have higher equivalent weights, are used in greater amounts in soft beverages than is phosphoric acid.

Weight and Cost of Neutralized Acid

In the case of phosphoric acid, the monetary loss is only 14c. for the 0.8 lb. acid wasted per 1,000 gal. of alkaline water. However, organic acid losses range from 1.2 to 1.5 lb. for the same type water, or from 30 to 50c. On this basis, a 10,000-case-per-day bottling plant (12-oz. bottles) may lose:

$$\frac{\$0.40}{1{,}000} \times 2.5 \text{ (gal. per case)} \times 10{,}000 \text{ (cases per day)} \times 300 \text{ (days per year)} = \$3{,}000 \text{ per year.}$$

In addition to the neutralization losses indicated, there is a further loss due to the buffering action of the acid salts produced. And the greater the alkalinity, the greater the buffering action. Franchise soft drink bottlers are usually required to install lime water-treating equipment where alkalinity exceeds 100 ppm. as $CaCO_3$, because higher alkalinities affect beverage flavors noticeably.

The salient point is that the bottler or food processor using a food acid with alkaline water is paying for water neutralization with acid losses, buffering losses, and the variations in flavors. It will now be shown that, for less than these losses or for the same amount, the water could be safely demineralized (or decationized), and the bottler or food processor could exercise better quality control over the ingredient that constitutes more than 85 percent of his product.

Demineralization Costs

A 10,000-case-per-day bottling plant (12 oz. bottles, 24 bottles per case), uses 25,000 gal. of water per 8 hr. for syrup making and filling. This requirement can be fulfilled by a 20 gal. per min. demineralization plant with a 15,000 gal. water storage tank. At 5 gpm. per sq. ft. throughput, two 30-in.-dia. cation and anion beds will suffice (based on 24 hr. operation). Bed depth should be at least 3 ft. making a total of about 15 cu. ft. of each resin required. Cost of the cation resin, at $15 per cu. ft., will be $225, while anion resins, at $33 per cu. ft., will cost $500.

A complete demineralization plant, excluding building or housing, will cost about $400 per gpm. capacity, including instrumentation. This figure will vary somewhat, depending on: (a) Size of the unit; (b) quality of the water to be demineralized; (c) flexibility wanted; (d) control desired; (e) amount of safety needed in the regeneration cycle; and (f) thoroughness of demineralization.

Cost of amortizing the equipment over an 8 yr. period (per 1,000 gal. water) may be calculated as follows:

$$1 \text{ (gpm.)} \times 1{,}440 \text{ (min./da.)} \times 333 \text{ (days/yr.)} \times 8 \text{ (yr.)} = 3{,}836{,}000 \text{ gal. treated.}$$

$$\frac{\$400 \times 1{,}000}{3{,}836{,}000} = 10.4\text{c. per } 1{,}000 \text{ gal.}$$

Cost of regeneration is given in Table II. When different, stronger and larger amounts of regenerants are used, higher capacities in grains per cu. ft. of resin can be obtained at higher resin and regenerant costs.

Overall demineralization operating costs may be estimated by rule of thumb. For the not too highly mineralized waters costs may be put at 2c. per gr. of total dissolved solids per 1,000 gal., and at 2c. per ppm. for silica. Therefore, a water having 100 ppm. alkalinity at 170 ppm. TDS would cost 30 to 40c. per 1,000 gal. to demineralize, including equipment amortization. (One gr. per gal. is equivalent to 17.1 ppm.)

Automatic control and large capacity plants minimize continual high labor costs, although initial cost of manually operated plants are less. The latter, of course, would have no mechanisms for indicating failures in the regenerative cycle.

A point of further interest, economically, is that in bottling plants having 40 or more trucks, and an alkaline water supply, the yearly cost for distilled water for truck batteries becomes appreciable. This cost can be eliminated by the bottler who demineralizes his own water.

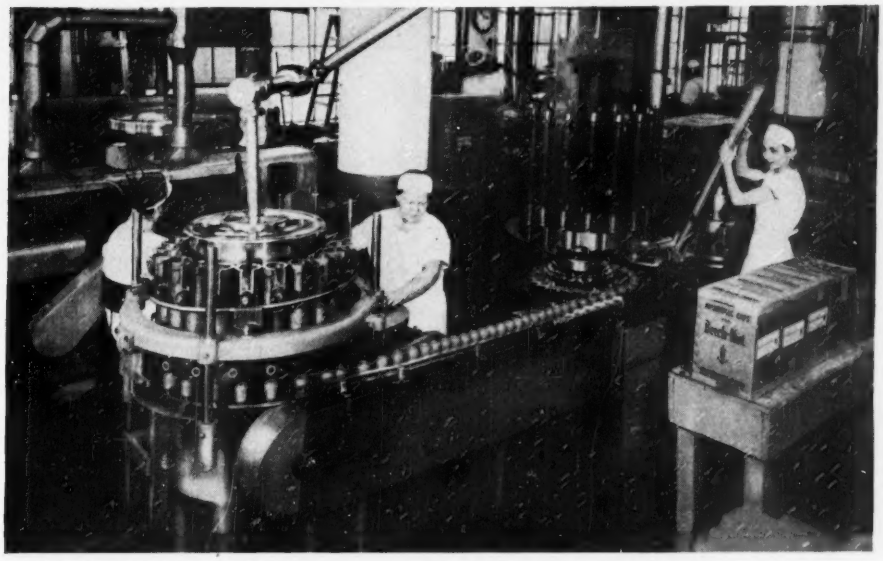
Blending Effects Economies

In locations where hard calcium and magnesium waters occur, many bottlers are forced to use decationization and blending or softening in their bottle wash and rinse waters in order to obtain clean bottles and to eliminate scaling on the bottle carriages.

Depending upon the original alkalinity of the raw water, and the free

(*Turn to page* 171)

A SPECIAL FOOD INDUSTRIES REPORT



TWO PACE-SETTERS in packaging progress. The 21-station filler (left) supplies up to 575 jars a min. to 16-spindle unit (right) that can vacuum cap 625 a min. Installation is at Beech-Nut Co.'s plant.

PACKAGING PROGRESS

Better Technics, Materials, Containers, Machines, Available.
They Will Help You Cut Costs, Protect Quality, Boost Sales.
Yesterday's Packaging Not Adequate in Today's Competition.

SIGNIFICANT TRENDS

STRIKING improvements in the packaging of foods have been made in the postwar years. These result from the combined efforts of the processors, the makers and converters of packaging materials, and the manufacturers of containers and equipment. This progressive trend in packaging may be expected to continue in the months and years to come.

In a nutshell, there are three prime trends that bid fair to continue this growth—

■ Constant introduction of new packaging materials featuring better protection of the product, more sales appeal, and new convenience for both the food processor and the consumer.

■ Steady development of higher speed, labor-saving machines handling a wide variety of materials of different sizes.

■ Continued redesign of old packages to make them simpler and more attractive, and to stimulate the volume of impulse buying.

Plastic and transparent flexible materials probably are commanding the most attention. Other packages receiving careful consideration are colored cartons with laminated finishes, new tin and glass containers, mesh and multi-wall bags, and window-fitted paper bags and cartons.

Manufacturers of packaging materials have been faced with an increased demand for glossy finishes on cartons and labels. This is being met through the development of new methods of applying special coatings that are resistant to abrasion. In certain cases, laminations of polyethylene and cellulose acetate to labels and cartons have proved successful.

Considerable emphasis is being given to special printing methods. To this end, some suppliers have expanded their facilities for rotogravure printing, which permits more detail and uniformity than other methods. In the letterpress field, there has been some development in the use of odorless inks.

Packages are being designed for unique display value and consumer

Prepackaging Gains in Popularity—And Profits

FRUITS now "machined" into visual bags have enabled self-service stores to cut down on retailing costs.

FRESH MEATS are packaged at retail stores or central warehouses to relieve bottlenecks at service counters.

convenience. Cartons are being made so that they can be set up more rapidly. This trend toward easier, more rapid assembly of cartons has even penetrated into the corrugated container field. Die-cut containers—of special design—are being used to a greater extent to eliminate the use of sealing tape required on the regular slotted carton.

Since the war, the food packaging industry has gone more and more into the use of laminated papers to obtain the desired characteristics of the different sheets. These properties include printing surface, grease resistance, flavor retention, sealing properties, and color combinations. A good example of the latter is the use of blue laminated glassine for fresh coconut.

Multi-Wall Bags Zoom

Manufacturers of multi-wall paper bags have made three price cuts—totaling 20 percent—during the past year. To the flour mills and sugar refineries, this price slash is bringing considerable savings. For example, one flour mill has slashed its annual packaging costs $200,000.

Production of multi-wall bags began to climb rapidly during the war when competitive cotton and burlap bags were scarce. In 1948, output of these bags reached 1,800,000,000—more than triple the prewar production.

Today's multi-wall sacks are better. They are made of stronger paper, which cuts down on the weight of the bags 25 percent. Specialty bags—those with a plastic-coated inner sheet—are finding more uses because they are resistant to greases, moisture and acids.

Rigid-container development isn't standing still, either. Improvements have been made in glass containers by new methods of cutting down on the amount of soda ash used to make them. There has been a move toward use of lightweight beer bottles. Some breweries have come out with beer in the new one-way, no-deposit bottles packed in convenient carry-home cartons. And one processor is already considering the idea of packing fruit in lightweight jars that are little more than half the weight of the conventional ones.

In the canning field, aseptic processes appear to be approaching the point of broader acceptance. Short-time high-temperature processing, with aseptic filling, may give certain kinds of canned goods new impetus in the race with frozen or prepackaged fresh products.

Aluminum shipping cases for fresh milk are "coming in" because they are lighter in weight, last longer, permit quicker cooling in storage rooms, and by reflection retard heat in delivery trucks. And there is at least one type of aluminum case that is specially designed to reduce bottle breakage.

Brewers are seeking a fiberboard shipping container for returnable beer bottles that will cost only 7¢. or 8¢. per trip.

Machines Geared for Speed

Through joint efforts of processors, suppliers, and equipment makers, considerable interest has centered on the development of high-speed production lines.

There is now a better understanding between machinery manufacturers and and processors concerning actual production line problems. Processors are becoming less secretive. Special new packaging materials are being devised to meet the demands of processors who have capitalized on high speed automatic packaging. Simplification of packages—without sacrifice of quality—and the development of thermoplastic adhesives have, to some extent, increased the speed of packaging frozen foods. Several different can companies have come up with frozen food containers that can be handled at rates up to 200 a min. on high speed closing machines. These cartons are of semi-rigid structure with metal ends. They eliminate inner bags and outer wraps, and no setting-up is required,

There has been a trend toward designing machines that are simpler to operate. Simplicity applies to changing parts, lubricating, need for fewer operators, and a rapid change-over from one size package to another.

Premium on Simplicity

Processors are redesigning their packages to make them simpler, more attractive and less costly. Expensive multi-colored packages have frequently given way to more effective two- and three-colored jobs. Changes are being made in the shape of cartons to reduce the square inches of board per package. Good, simple labels are superseding the embellished ones, and they are individualizing the less costly stock-shape bottles.

Manufacturers and converters of cartons and transparent films report healthy trends in the prepackaging of fresh meats and produce. Transparent packaging has created more "impulse buying" than any other technic. Many retailers report that meat sales have been increased by prepackaging. One large chain store reports that it is "paying for film wrappers out of the garbage pail." Damage and spoilage of products was high—up until the time these items were prepackaged.

Terminal (central warehouse) packa-

ging of produce has grown from small hand operations to those employing mechanized equipment. Though some meats are being packaged in centralized warehouses, preference, at the present time, favors the retail-store operation, with meat packers contributing their experience, facilities and "know-how." Some independent stores that do not have the volume of business to install expensive packaging equipment are being supplied by individual prepackagers.

Large chain stores, who have gone in for prepackaging fresh produce, have mechanized their operations wherever possible. They have lengthened the life of the products through controlled refrigeration of produce from warehouse to store. However, they still must offset the cost of operating the equipment by cutting down retailing expenses, increasing their sales volume, and saving on the handling of waste.

Strides in the prepackaging of produce are continuing despite the precooling, packaging and engineering problems. Information will be available on limitations and possibilities of packaging materials, weight losses of packaged produce, storage life, decay control and chemical changes within the package.

Meat packers have come up with findings that have enabled them to protect their products better. They are using: (1) Temperatures short of freezing, (2) a special cellophane that minimizes discoloration, and (3) a combination of low intensity light and low holding temperatures.

TODAY'S TECHNICS
Yesterday's Aren't Good Enough

HEAT TECHNICS for sealing polyethylene are currently the subject of much investigation. And radically new and improved heat sealers and bag-making machines will be available in the near future.

This film can be heat sealed (at 250 deg. F.) on conventional equipment if a slip-sheet is used to prevent the film from sticking to the face of the sealer. The band-type sealer that first passes the film joints through heated sealers, then brings them between chilled rolls, also effects good sealing. Because of its electrical properties, "poly" cannot be sealed by so-called electronic units that depend upon high frequency heating. But this difficulty can be overcome by sandwiching the film between layers of another material, such as cellulose acetate.

Cheddars Cured in Film

Another plastic material, Pliofilm, has made a name for itself. Curing of 40- and 60-lb. squares of Cheddar cheese—using tensilized Pliofilm and corrugated or fiberboard containers to produce a rindless product—is revolutionary. And this method is coming to be used in place of the conventional method of bandaging, paraffine-dipping and packing 75-lb. round Cheddars in wooden boxes.

Bulk Cheddars cured the new way mean less work for the cheesemaker through elimination of the bandages and paraffine. There is no "dry-out" or weight losses which occur before or after paraffining. Nor are there any cleaning or trimming losses.

Cured rindless Cheddars are then cut into consumer-size units and wrapped in Pliofilm. Pressure is exerted against the film as it clings to the cheese. This pressure "welds" the tensilized film to the product, sealing out air and moisture and thereby preventing mold growth.

There have been many new uses for Pliofilm in packaging fresh produce. Outstanding development has been the relatively recent method of "stretch-wrapping" fresh fruits and vegetables in this film. Basically, this consists of heating 120-gage Pliofilm, stretching it to thin it to a 20-gage film, and heat-seal-wrapping products in it.

Longer shelf-life and greater sales appeal have been attained by this wrapping technic. Product protection is achieved by the film's ability to retain moisture and at the same time permit the escape of harmful gases generated by the fruit or vegetable.

Three different stretch-wrap machines have been designed. One takes two sheets of film and stretch-wraps 800 oranges a minute. Another uses one sheet of film to wrap 75 apples a minute. The smallest and simplest machine packages 14 heads of lettuce per minute.

One of the recent outstanding flexible packaging developments is the use of gas or vacuum technics. Fresh, sliced bacon, vacuum-packed in a cellophane-Pliofilm bag, is now being marketed by Armour and Company. Another processor, Farmers Nut Corp., has adopted the gas-packing method for bulk-packing 30-lb. of roasted, salted peanuts in a laminated bag within a corrugated carton. This company is also gas-packing peanuts in consumer-size units.

Recently, an independent meat packer has adopted this technic to vacuum-pack sliced luncheon meats for self-service. And further work is underway to apply this technic to frankfurters, natural cheese, coffee and frozen fish.

A note about gas-packing in rigid containers: At least one company is filling nitrogen-treated salad oil into bottles and guarding the headspace with nitrogen. As a result, it is no longer necessary to protect the oil from daylight by use of colored bottles or by employment of covering cartons. Examples of other foods treated this way are orange juice, shortening, and cranberry jelly.

Aluminum is finding increased use in bottle closures. One company has come up with a novel top and side rolled-on seal for catsup. A special machine applies the closure and rolls the thread at the same time.

In the confectionery field, Charms Candy Co. has invented a hard-candy packing machine that cellophane-wraps and heat seals 300 candies per minute. Another unit then stacks them in units of ten. And still another machine overwraps and heat seals the ten-tablet unit in a special, laminated foil wrapper.

The candy industry has also gone in for high speed packaging by adopting European-made machines that kiss-wrap candies at 220 a min. and square-wrap them at 500 a min.

Hygroscopic foods are keeping better through the adoption of a relatively new technic that calls for packing products in a water-vapor resistant package with an inert, harmless desiccant. This method of protective packaging is employed for dehydrated foods, condiments, cereals, hard candies, potato chips and bakery items.

For consumer-size packages, the desiccant is put up in 5, 10 and 15g. packets, made of heavy tea bag paper and printed in accordance with U. S. Food & Drug Administration requirements. These packets are placed in food packages at the time of filing.

Pressurized Cans for Convenience

A recent development in the canning field is the use of pressurized containers for packaging whipped-cream toppings. This container has come a long way during the past 2½ years. Used initially was a beer-type can, such as was also adopted for the military "bug bombs."

Now improvements have been made in the methods and the materials for filling, closing and dispensing. Result: Costs have been sharply cut.

Cream packed in this can is charged with nitrous oxide and carbon dioxide. These gases give the product the desired "whipped" consistency and they serve to eject the cream from the can when a finger-tip valve is pressed.

A new and rapid method has been devised for packaging irregularly shaped meats. This process, called the Moldart method, utilizes two simple semi-automatic machines—a wrapper and twister.

The wrapper feeds transparent film from a roll to a wrapping platform. At the same time it moistens the film, applies a line of adhesive, and cuts a sheet. The product is placed in position on the film and then wrapped, with the glued edge overlapping.

Next, the operator passes the package to the twisting unit for completion of the wrap. One twister handles the output from two wrappers. The operator grasps the open ends of the package, holding it in position on a rotary belt where it is spun and the ends thus closed.

Faster Packaging of Pies

A special cartoning machine, in use at Rice's Bakery, Baltimore, packages 2,400 large pies or cakes per hour. This speed has been achieved through the adoption of a rigid, cellophane-window carton that eliminates the conventional film-overwrap and troublesome sticking of icing to the wrapper.

Want More Information?

The name of any manufacturer, converter, consultant or designer whose contribution to food-packaging progress is mentioned in this Special Packaging Report may be obtained by writing to FOOD INDUSTRIES, Editorial Department, 330 W. 42nd St., New York 19, N. Y.

Still another machine has been designed for cartoning small, 10c.-size pies. This unit automatically picks up carton blanks from a magazine, sets them up, feeds pies to the cartons, and then closes them at 60 a minute.

A new type of package—wallet shaped and thus providing individuality for the meat packer and convenience for the consumer— is used for franks, sausage links, sliced dried beef, bacon and ground beef. Each package is a single unit, requiring no liner.

Faster setting up of corrugated shipping containers is now being achieved through the use of pre-stapled cartons that snap open ready for use without taping. This new item is reported to save 8 to 10 man-hours per 1,000 cartons. The container opens rigid and ready for filling. To open it, all that an operator does is hold the opposing flaps and apply pressure and a simple "twist of the wrist."

LATEST MATERIALS
For Doing the Job Better

POLYETHYLENE has, as indicated, aroused much interest in the packaging field. This plastic is variously supplied as a film, tubing, closure, laminate, and even container.

One of its earliest successful adaptations has been in the packaging of frozen poultry. Now its uses have spread to all branches of the food industry. A large meat packer, for example, is packaging 50 to 60-lb. veal carcasses in this film. He claims that the "bloom" of the meat is preserved for a longer time in "poly" bags than in the former ones. Other foods now being packaged in this plastic include seafood, dairy products and frozen vegetables.

Liners for bags and fiber drums and cartons are another recent outlet for polyethylene. The liners permit the use of lower-priced outer containers that usually have lower tare weights.

Polyethylene-lined paper bags have recently been introduced for packaging whole, sliced, and French-fry cut potatoes, peeled apples, and other such items. Bags are available in one, two, or three outer walls of kraft paper, and with the liner either inserted loosely or sewn into the bottom seam. Liners are made from seamless tubes, either flat or with gussets, which vary in width from 2 to 54 in. Top closures may be either heat sealed or folded, gathered, and tied.

The food industry is also seeing wide uses of "poly"-lined drums and cartons for bulk shipment of meats packed in brine, frozen meats, dried buttermilk, condensed buttermilk, cottage cheese, liquid and frozen cream, ice cream mixes, and frozen fruits and vegetables.

Because of its exceptional physical properties—low moisture-vapor transmission, high permeability to most gases, differential transmission of food odors, and flexibility at low temperatures—polyethylene film has proved a notable development in the hard fight against the food packaging problems.

Low water-vapor permeability at 0 deg. F., together with flexibility at low temperatures, indicate many possibilities for both the "poly" film and resin in packaging frozen foods. While high oxygen and carbon dioxide permeability rules it out for inert-gas or vacuum packaging, high levels of transmission of these gases through the film warrant its use in the ever-expanding produce prepackaging field. Returnable stretch is a property of the film that permits overwrapping many foods, particularly symmetrical ones. The film's low moisture permeability permits its use as a protective film for foods that absorb moisture. It also retains moisture in packaged foods, such as sausage products.

Laminations—like "poly" to foil—are meeting demands for a protective wrap. Combinations of "poly" with other materials are available for special needs. When laminated to a printable and stable plastic film, the resulting sheet is strong, easily fabricated and sealable.

Multi-colored inks printed on polyethylene film do not stand up too well under severe rubbing or distortion. But one supplier now achieves a print job that is considered superior to earlier printing on this film. He employs rubber printing plates to achieve a more satisfactory impression.

Another plastic film that is gaining headway in the food industry is a blend of polyvinyl chloride-nitrile rubber. First used as a squeeze-pouch for capsule-coloring of oleomargarine, this film has properties appearing to offer bright promise in other food-packaging applications.

This film, strong, elastic, greaseproof, heat sealable, inert and tasteless, has been used to wrap processed meat loaves, pickles and cheese. Manufacturers say the film can be used to package sliced luncheon meats for self-service. Outstanding feature of the film that lends itself to this type of packaging is its clinging property, which may make it unnecessary to vacuum-package some self-service items in flexible films.

Now to the use of the vinyl films themselves—mixed polymers of either vinyl chloride or vinyl acetate, or copolymers of both. Their employment in food packaging has increased within the last few years. Milk containers have been coated with this plastic. Such coated containers are also adaptable for other liquid foods.

From plastic-coated rolls of paper, the containers are die-cut in the flat and shipped in this manner to dairies. Blanks are then fed into specially designed equipment that forms, sterilizes and fills the containers.

Vinylidene chloride resins, combined with other materials to make an oriented thin film, are used to package

meat products and such irregular shaped items as poultry. Available in tubular form, this film is shrunk around the product by application of heat, and then the packaged item is frozen.

A special cellophane has been developed to minimize discoloration of consumer cuts of fresh meats. Tests have shown that this film maintains the color of fresh meats for about 72 hr. when held at 34 to 40 deg. F.

Longer color retention is obtained because of the film's low water-vapor permeability and low water-absorptive properties. This material has a "wettable" surface that must be kept in constant contact with the meat.

Better Waxed Papers

One significant trend in the waxed paper field is the use of new additives in the wax. These modified-wax coated papers are used to wrap bakery products and other foods. The wrappers have a high-gloss finish and anti-rub-off properties. And they provide a seal for moisture-vapor protection.

Resin-coated waxed cartons are also finding many applications. This is particularly true in the case of frozen food cartons. These containers have enabled suppliers to develop heat sealable coatings that remain pliable at low temperatures without cracking or flaking.

Another new thermoplastic wax-resin-polymer coated frozen carton has been developed by Seabrook Farms in cooperation with a group of suppliers. This special coating serves as a leak-proof barrier against water and water-vapor, eliminating need for a liner or overwrap. Like that used in cereals, the carton is in one-piece and has a full-seal end. A new machine sets up, fills and heat seals cartons 100 a min.

Use of this carton is not limited to frozen foods. It is claimed that it also can be used for dry, hygroscopic foods, like cereals, dessert powders, and the like. It is also hailed as one of the first folding cartons that is sift-proof.

Wet Strength Papers

The addition of small amounts of urea-formaldehyde or melamine formaldehyde to papers before they are formed has imparted wet strength properties to them. Papers made by using these resins can be soaked for weeks at room temperature and still remain strong and tough.

One of the most interesting of these papers is wet-strength glassine for wrapping frozen foods. Wet-strength, greaseproof papers are also being used for butter, cheese and ice cream. Wet-strength kraft papers have also received wide use.

Plastics an Aid

POLYETHYLENE LINERS permit use of low-cost, lightweight bags for bulk-packing moist foods and even liquids and semi-liquid products.

Developments in Resin Coatings

Further on the modified waxes: These overcome certain limitations of paraffine used as a coating agent. The brittleness of paraffine at low temperatures causes cracking. This, in turn, allows moisture-vapor to penetrate. As an adhesive, paraffine shows a lack of bonding strength. It exhibits lack of cohesion for many coating applications, permitting flaking, scuffing and chipping.

Resins like polyethylene, butyl rubber, S-polymers and polyisobutylene, when added to waxes, improve gloss, tensile strength, toughness, flexibility, adhesion, heat sealability, resistance to moisture-vapor transmission, and grease resistance.

Application of polyvinyl acetate dispersions to various papers has assumed considerable importance, since the dried films are free of odor and color. These properties make them valuable in the coating of containers for greasy foods, since they show no evidence of grease or oil spots.

The adhesive properties of polyvinyl acetate have led to the adoption of this resin for binding a multitude of materials—laminations of foil to paper and cellulose acetate to paper.

Newly developed resin emulsion adhesives have been used for fabricating cellophane bags. These adhesives provide a stronger bond and reduce the bleeding and penetration of inks.

Notable developments have also been made in the aluminum packaging field. In a new all-aluminum container, frozen food products may be baked, frozen and reheated. Not limited to frozen foods, this container is also being used for baking cakes and packaging deep-dish pies, candies, certain processed meats, vegetables, salads, and deserts. And aluminum foil is used to wrap precooked frozen foods that can later be reheated in the same wrap.

Collapsible aluminum tubes are likewise finding new uses, despite the fact that entirely suitable lacquers have not yet been developed. While the use of these tubes is limited in this country, they are being extensively employed in Europe. Outstanding is their use for packaging mustard. And it is reported from Switzerland that mustard in tubes outsells the glass-packed 10 to 1.

Over here, such tubes have been used for anchovy paste, and now are coming to be employed for honey, cake icings, peanut butter and cheese spreads. Tube manufacturers hope to see catsup and chocolate syrup packed in them in the not too distant future.

Food in Aluminum Cans

In Norway, greater quantities of aluminum cans are being used to pack food because over there they are readily available and only slightly more expensive than tinplate containers. Most of that country's aluminum cans are 0.33 mm. gage. Thus, these sheets are not much thicker than the steel or tinplate we use for the same purpose.

Aluminum cans cannot be made on existing high-speed tin can-making machines because of the working properties of the metal. It is difficult to solder aluminum, and welding is not the answer. Accordingly, use of aluminum for making cans is limited to: (1) Extruded cans, (2) drawn cans, (3) those with non-soldered side seams (cemented), and (4) aluminum ends for use on tinplate bodies.

In sterilizing aluminum cans, the Norwegians have eliminated the problems of distortion and burst seams by employing special over-pressure retorts. These units use air pressure to counterbalance the internal pressure built up in the cans during retorting.

For certain foods, aluminum is unsatisfactory, hence the cans must be coated. The cans corrode when they are used for processed meats, fruits, vegetables, fish products with acid sauces, and wet products containing salt. Before aluminum cans can be used for these products, they must be anodized or lacquered.

On Next 3 Pages—A Panorama of New Packages ⟶

NEW PACKAGES

Accent Appeal, Protection, Convenience

MRS. CONSUMER sees what she buys. New sleeve package needs less material, runs efficiently on high-speed units.

ENTERPRISING food processors, facing both heavier competition and more discriminating demand, have developed a wide variety of improved packages—as graphically illustrated in these photos. Greater point-of-sale appeal, better product safeguards, and augmented handiness and utility for the consumer are emphasized. And incorporated are many new efficiencies in processing performance, demanded by rising costs both on the production lines and in the distribution channels.

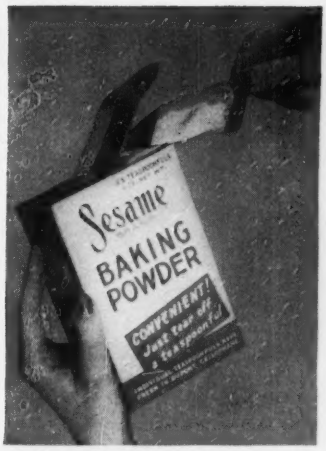
FOIL WRAP adds eye appeal to margarine, protects its color against light. Prints are packed in window carton.

OVERWRAP, coated with wax and "poly", can be heat-sealed at 110-a-min. rate. Pictures lend appetite appeal.

PIE is visible through window carton. Built-in handles facilitate toting and reduce product damage.

Handier to Use—Quicker to Sell

PLIOFILM bag of sauce in can of wieners keeps products separate.

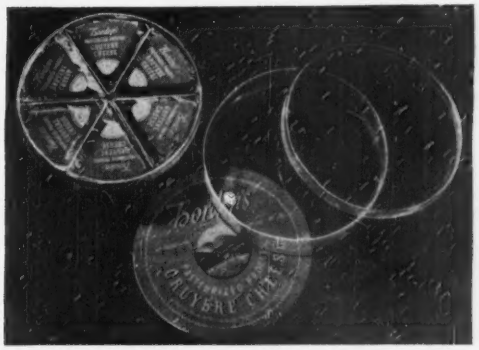


FILM-PACKED teaspoon-portions of baking powder for use as needed.

PRECOOKED frozen food is heated in foil envelope and quickly served.

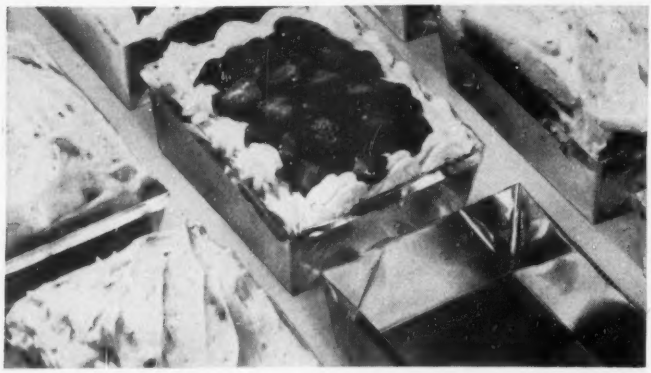
SIMPLE cotton rip-tape enables consumer to open confection and cheese packages in jiffy. Opened package is neat.

NOVEL pack of 60 separate butter pats simplifies serving, provides measured quantities for home-cooking.



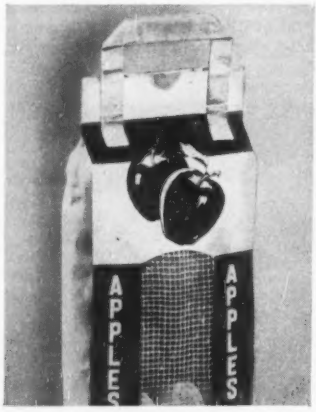
PLASTIC CONTAINERS have strong sales appeal, protect soft foods, and are re-usable.

New Packages Also Help Processors and Retailers Cut Cost



LIGHTWEIGHT aluminum trays for frozen foods. In them, products can be baked, frozen and reheated. Picture shows strawberries topped with cream.

CRACKER packaging is speeded by wrapping small separate units.



THREE PREPACKAGES in this row are easily machine-filled, save retail handling costs, cut spoilage losses. Left: Apples in mesh-window bag. Center: Onions in cellophane-window pack. Right: Oranges in elastic-top bag.

Product Protection Is Offered in Many Ways

CRYSTAL-CLEAR Saran film guards dried fruit against moisture-vapor.

PLIOFILM pouch. It keeps these brine-packed mackerel liquid-tight.

WAX COATING for frozen poultry provides form-fitting seal.

NEW PACKAGING MACHINES
Set Higher Standards of Performance

INCREASED SPEED of operation, flexibility for handling different sized packages at variable operating speeds, and greater use of sanitary materials of construction mark the postwar developments in the packaging equipment field.

Fast Sealing Unit Described

Outstanding is a new rotary 16-spindle vacuum-capping machine. This unit is designed for either steam or mechanical vacuum application of caps to glass jars or bottles. Completely automatic in operation, it meets the requirements of the fastest production lines, capping up to 625 jars per minute.

Caps in sizes from 28 mm. to 89 mm. can be used. And glass containers with heights of 3 to 8 in. and diameters of 2 to 4¼ in. are accommodated: Moreover with special equipment other diameters can be handled. This machine is used extensively on the production line of baby foods.

Precise mechanical sealing action and the use of superheated steam eliminate the need for a water bath or spray. The type of construction used in the conveyor chains and jar handling stars permits the use of prelabeled packages. Dating and marking devices may be installed either on the discharge turret or on the automatic cap feed. All exposed metal parts on the machine are of stainless steel, bronze, or are covered with a protective coating.

In the packaging of materials in cans, an outstanding development has been made in the handling of tuna fish. Here, a new machine has eliminated a complete department in the tuna canning plant. The unit shapes, cuts, and places tuna in cans at an output of 130 per min.

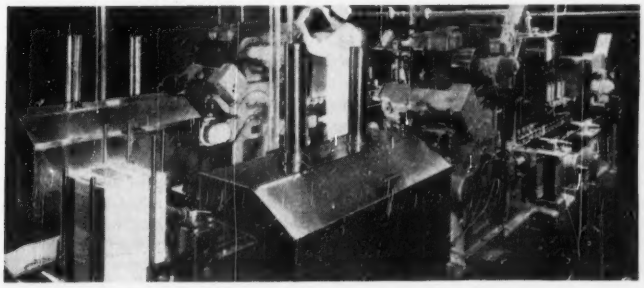
Two endless-type stainless steel chains held by adjustable guides are arranged in elliptical form on the machine. Coming together, they form a moving tunnel carrying the tuna loins. Guides bear on the sides of the chain to form a solid cylinder of fish. A knife then cuts off the desired amount and it is placed automatically in the can. Expressed in terms of labor, the unit packs as much in 1 min. as a hand packer turns out in 1 hr.

Notable progress has been made in automatic heat sealing equipment. Among the late machines is a unit for handling polyethylene capable of completing 75 packages a minute. In this equipment the manufacturer incorporated special postwar materials—Silicone rubber and Teflon—thus producing an improved machine.

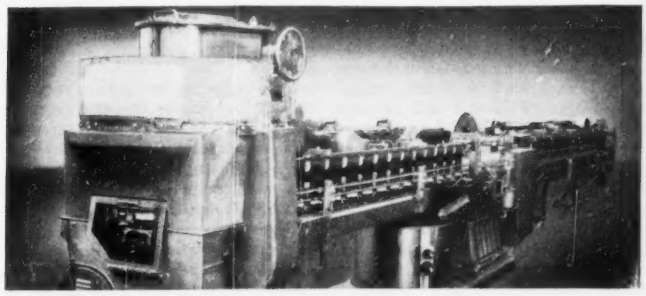
Polyethylene has a low melting point of 215 deg. F. Accordingly, trouble was encountered in its sticking to the sealing surfaces. But this has been overcome by coating the unheated dies with Silicone rubber. The heated dies have been redesigned and constructed with Teflon. This enables the dies to maintain a minimum of heat variation, which in this case is limited to 2 deg. F.

Still another development is a machine for the packaging of margarine

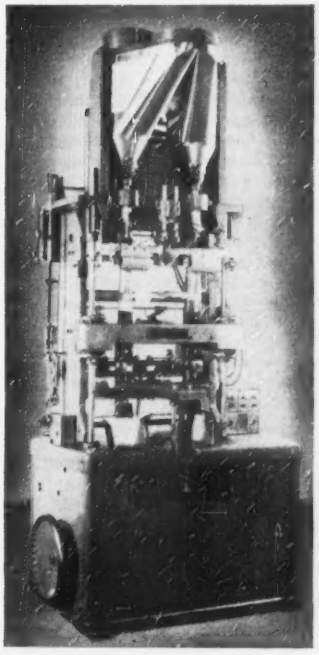
These Are New Efficient Multi-Job Packaging Units



IN THE DAIRY, this machine sterilizes side wall, bottom and top blanks, also automatically forms cartons, fills them and seals with foil.



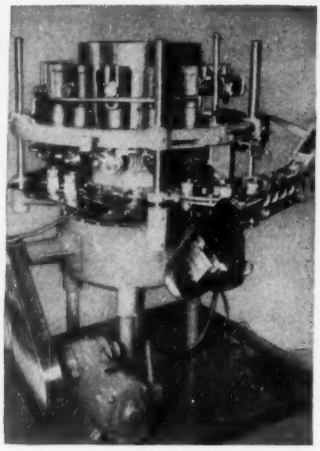
THIS UNIT bottom-seals cartons, fills them through adjustable measuring cups and then does top-sealing job, all at rate of 160 a min.



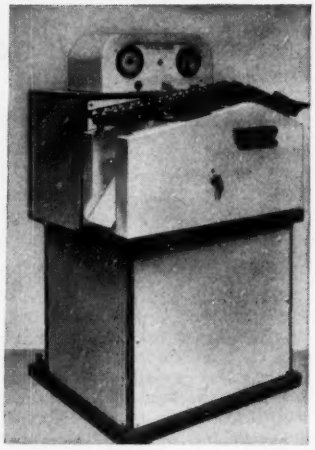
POLYETHYLENE is heat sealed by this unit that weighs, fills, wraps.

These Single Units Form Cartons, Fill, and Check-Weigh

LOCK-TYPE trays and cartons are machine-formed by this equipment.



MULTI-POCKET, plunger-type filler handles liquids and semi-liquids.



ELECTRONIC UNIT check-weighs 90 cartons a min. Has reject features.

in plastic film, as mentioned under Materials. This machine also deposits the coloring unit within the package automatically. It takes roll film, forms the material over a cylindrical shaping tube, heat seals the web into a cylinder, then heat seals the bottom of the package. As the web is being heat sealed it is also being drawn down to the required length.

Equipment now takes molten cheese, runs it over a rotating drum which chills it into sheets ⅛-in. thick and several feet wide. Circular cutters then slice the cheese into 3 in. strips. An arrangement of rollers automatically gathers the strips into stacks of eight. Then another cutter slices the stacks to make three inch squares. These stacked squares are then automatically wrapped. A single machine can turn out 2,400 slices per hour.

Other new heat sealing units have wide-mouth entrance arms to accommodate bags of various sizes. These sealers installed along a conveyor line leading from the filling machines, are capable of handling 80 packages per minute. They are completely self operating.

Faster Filling

With capping machines setting the production pace, a speed-up of the filling operation was demanded. Filling machines for such products as baby foods, apple sauce, and oil (semi-liquid and liquid foods) have accordingly been developed for faster output. These units are multi-pocket plunger-type machines.

Among the fast fillers are 20-, 21-, and 24-pocket machines. One has been stepped up to a rate of 575 cans or jars per minute. This machine will handle a range of can sizes from 2⅛ to 5⅛ in. in height.

These units also exemplify the structural-material trend to better sanitation. Non-corrosive materials are used extensively. In one of these units the piston and valves can be easily and quickly disassembled for cleaning.

This stress on improved sanitary structure is even further exemplified with development of fillers for use in small and medium size dairies. Here, the sanitary features of larger production machines have been incorporated. Typical is a 7-valve filler having a speed range of 20 to 50 bottles per minute.

Still another high capacity filler is a recently developed 12-pocket model pea filler. This machine has a capacity of 300 No. 2 cans per minute. Here again, non-corrosive materials are employed. Food contact parts consist of stainless steel and copper-free nickel alloy. Briner cups and built-in steam coils are also made of these same materials.

Versatility of equipment is evidenced in a new type of machine adaptable for use in filling any free-flowing product, such as milk, honey, syrup, and vinegar. This unit will fill into almost any type of container, a quantity of liquid product uniform within ±2 percent of the desired volume. The machine works on the principle of discharging liquid from a constantly level source through an orifice for an accurately measured interval of time.

Other units have been developed for the filling of diced vegetables and fruits. These are multi-pocket. One, an 11-pocket unit, operates with No. 2½, 2, 303, or 1 Tall standard size cans at speeds ranging from 61 to 168 cans per minute. Features of this machine include the no-can-no-fill device, also a vibrating can track which causes the product to settle as it is filled, thus eliminating need for plunger action.

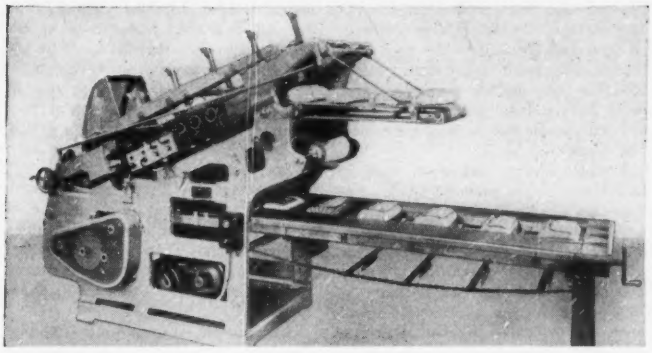
Other new machines handle the packaging of fresh produce and fruit intended for the consumer market. One of these, notable as simple in design, fast operating, and a big labor saver, consists of a circular rotating table sloped toward the outer edges. Fruit, after being dumped on the center of the table, gravitates to the moving outer rails, to which bagging scales are attached. The operator controls the machine by foot switch. He puts on the empty bags, which then rotate clockwise around the rim of the table and gradually fill with fruit. A second operator removes the filled bags and transfers them to a conveyor feeding the bag sealer. Two operators are capable of filling up to 25 bags (10-lb.) per minute.

Weighing Speeded

Two packaging operations frequently combined in one unit are weighing and filling. Again, speed is foremost in recent developments. A typical example is in the packaging of such dry products as elbow type macaroni, where 2, 4, or 6 packages are filled at one time.

These automatic units weigh at high speeds with superior accuracy. Principal components are weighing units each equipped with its own bucket dumping mechanism, vibratory in-feed,

Machines Now Prepackage Meats and Produce



MEATS and vegetables, in open boats and U-boards in a wide range of sizes, are machine-wrapped. One operator feeds and removes packages.

FOOD ITEMS of various shapes are readily film-wrapped in this unit.

basic frames and drive, and conveyor and container register for fully automatic weighing and filling. All machine parts coming in contact with the product are non-corrosive and easily cleaned.

Another example of these multiple units is one presently being used for coffee. This automatic weigher and filler scales out 16 lb. of coffee, divides it into 16 equal parts, and dumps into 16 waiting containers.

Check-weighing has become extremely important. Electronic units, specially developed for this purpose, are used extensively with volumetric fillers. Installation is on the finished-package conveyor line.

With these units, an over and underweight tolerance is established for each package size. By this means, improperly filled packages can be detected and rejected automatically. Rejected packages can then be picked up periodically and emptied into the supply hopper of the filler. Speeds are up to 90 packages per minute.

Automatic electronically controlled net weighing machines have been developed which operate on bags, cardboard cartons, glass and metal containers. They incorporate feeders that will handle, without breakage, such delicate materials as tea leaves, and at the same time assure uniform flow to the weighing bucket. Up to 30 charges (1 lb.) per min. can be handled with an accuracy within 1/16 oz.

Electronic counting machines using photo cells are in use for filling containers by number of items. These will tabulate exceedingly small items at rates up to 15,000 per minute.

Cartoning and Packaging

Machines are now in use which automatically set up lock-type trays from flat, unglued blanks. With an overlap of cellophane, this type of container is suitable for many products. This carton design is economical, since it eliminates the cost of pre-gluing blanks. Cartons can be set up and delivered on a conveyor at whatever speed synchronizes with the filling operation. Speeds in excess of 100 cartons per minute can be obtained. The carton magazine on one of these machines holds from 500 to 1,000 blanks, depending on the style of carton.

Another unit, entirely automatic, feeds cartons from a supply, bottom-seals them, fills through adjustable measuring cups, and top seals the cartons. With free flowing materials of uniform density, such as salt, rice, and cracker meal, this machine can operate at a speed of 160 packages per minute.

In the dairy industry, a carton forming and filling machine is now in operation which takes the side wall, bottom, and top blanks, heat sterilizes them, forms cartons in ½ pt., 1/3 qt., 1 pt., and 1 qt., sizes, fills them automatically to exact measure, makes an aluminum foil seal, and delivers the finished package of milk ready for distribution. Speed: 70 to 75 cartons per minute.

Wrapping Advances

Irregular shaped items can now be wrapped automatically by new machines. Heads of lettuce, fruit cakes, ham shoulders and picnic packs are varied items handled. With one such machine, an operator first places the required-size sheet of film (cellophane) over a 9 in. aperture on top of the machine. Next, she lays the item to be wrapped on the film, then pushes it through the aperture. Then she hits two switches, one with each hand, (a safety measure), bringing together a pair of sealing jaws.

Sealing under heat and pressure is accomplished in approximately 3 sec. Action of the pair of jaws coming together gathers the cellophane material and forms a tight wrap around the object. A single operator will handle between 10 and 15 items per minute.

Another unit wraps in cellophane, meats, provisions, and delicatessen items on cards or in trays. A chain-feed conveyor carries them into the machine. This unit is quickly adjustable within the following range of package sizes: 3¾ to 16 in. long, 3 to 8 in. wide, and ⅜ to 6 in. high. It can handle 20 to 40 packages per minute, depending on package size and product wrapped.

Overwrapping machines now offer new flexibility in banding and wrapping many types of packages. One can overwrap paper cartons, band metal-end cartons, overwrap metal-end cartons, and impart a recessed end-seal. Automatic controls now incorporated have speeded the wrapping to as many as 100 packages per minute. Calibrated scales at adjustment points permit quick changeovers from one package size to another. This unit handles packages ranging from 4½ to 10 in. long, 2¼ to 6 in. wide, and 1 to 3 in. high. A centralized heat-control panel allows fingertip adjustment of bottom heat, side heat, and pre-heating of latest heat-seal materials.

Other units apply trademarks in the precise same position on the package. In bread wrapping, one machine positions a printed label in a predetermined relationship to the loaf by means of a photo-electric cell. A feeler arm measures the height of each loaf and actuates a mechanism which registers the position of the top and side panels automatically. This unit handles 40 to 45 loaves per minute.

Another apparatus automatically bands frankfurters at the rate of 60

to 65 per minute. It can handle franks ranging in size from 16 to 32 mm. diameter 3¾ to 7 in. long.

Machines now vacuumize and heat seal in one operation such odd shaped items as poultry, meat loaf, and cheese in transparent materials. The product and bag are then dipped into hot water bath, which causes the bag to shrink tightly around the product, producing what is virtually a second transparent skin. This produces a moisture and vapor-proof wrap which prevents loss of color and flavor, and in the case of refrigeratory foods prevents drying out, loss of weight, freezer burn, and mold growth. Here, output is clocked at up to 500 pieces per hour.

Among units developed for the wrapping of frozen foods is one which wraps all materials used by these packers, including laminated foil, and registers the printed design on the package by electric eye. This machines' speed is in excess of 100 packages per minute.

The wrapping, without use of cardboards, of such delicate items as crackers and cookies, is also now accomplished by machine.

Label and Code Developments

New equipment likewise has been devised for the application of thermoplastic labels on containers. This unit eliminates the glue pot, and hence all down time for clean-up of any of the adhesive. Labels are attached, leaving no adhesive smear, on over 300 bottles per minute. Bottles are fed to the unit on a slatted stainless steel conveyor. They then enter a worm feeder which properly spaces the bottles automatically. The bottles are then brought in contact with a heated roller that activates the label and then presses it onto the bottle at a fixed position.

With horizontal rolling-type labelers, speed of adjustment from one size can to another has been featured. With some units changes can be made in 30 sec. One high-production, heavy-duty straight-through labeler combines an elevated feature with high discharge, thus permitting a direct gravity feed into some models of casers. These units have a label capacity of 3,000 and will handle 300 or more containers per minute.

Product coding has also risen in importance in the packaging field. For such coding can give a quick check-back of contents, sources, grade batch, date of packing, sources of containers, plant and machine operators, or packer destination and date of withdrawal. It is a good form of business insurance, as evidenced by the numerous instances where processors have benefitted through ability to make these references.

Coding machines are very simple in their operation and are completely automatic. They are designed for synchronization with the cartoner, sealer, wrapping machine or filler, and they have adjustable speed to match travel rates of 35 to 150 units per minute. One small type unit is actuated merely by contact with the objects it marks as they move along the line, requiring no outside source of power.

Auxiliary Machines

To keep up with the speed of mechanical packaging and filling operations, auxilliary units have been mechanized. Automatic casers, uncasers, container dryers, and other units, have been perfected.

For example, an automatic empty-can unloader separates cans from cases automatically and conveys each to its respective place in the packaging line.

Units are now also in operation which remove empty bottles and dump the debris from the cases. Both cases and bottles are then separately conveyed to the following processing steps.

Brush dryers now take cans from fillers or sterilizers and dry them to assure proper labeling. These units are self operating and can be speed-regulated to the other machines on the line. In one specific unit, various sizes of cans are washed, dried, or both, at 300 per minute. This machine is very compact and eliminates long air drying conveyor lines by doing the same work in less space and time.

Improvements have been made in unscramblers. An example of one of these is a rotary filler machine which receives bottles from a single washer and then satisfies the demands of two fillers, regardless of the speed of either filler.

Another piece of equipment recently developed is an empty-can ejector installed following the filling station. It operates through a permanent magnet above the can line. Empties are lifted by magnetism out of the line and removed. This unit is self operating.

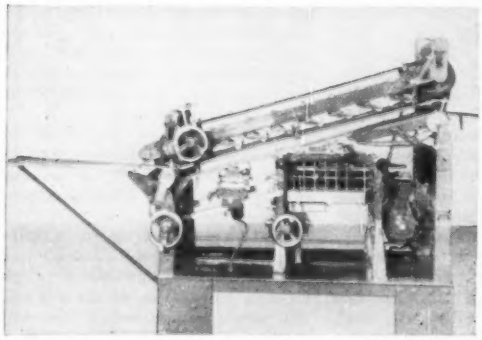
Automatic devices now detect and reject cans which have defective labels. They will detect and reject bright cans, cans upon which the label has been placed crooked or off center, and cans with loose labels.

Carton casers and sealers have also been stepped up. Case sealers are capable of handling up to 3,000 cases per hour, and they come equipped for push-buttom adjustment to different case sizes.

Highly sensitive electronic metal detectors have also been developed for final checks on finished packages.

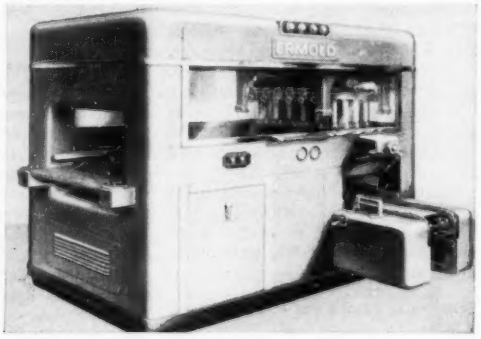
ACKNOWLEDGEMENT: more than 200 companies and individuals contributed information and pictures used in the preparation of this Special Packaging Report. And the Editors of Food Industries wish to acknowledge this help and express appreciation for the fine cooperation which made the report possible.

Labeler With Up-Lift



STRAIGHT-THROUGH labeler has an elevating feature for high gravity discharge to casing unit.

Automatic Uncaser



THIS MACHINE automatically removes bottles from cases and transfers them to a conveyor line.

How To Test Your Air-Blast Freezer

Effective procedure developed at WRRL is readily adaptable, requires time of only two people, and can be depended upon to provide pertinent data for making your freezing operation more efficient

E. LOWE, G. S. SMITH, and O. H. SPAUGH
Western Regional Research Laboratory, Bureau of Agricultural & Industrial Chemistry, Agricultural Research Administration, USDA, Albany, Calif.

Processors who freeze food products may now conveniently gage the efficiency of their own air-blast freezers—by adapting the test methods described here.

Once the required equipment is installed, only two men are needed to make the studies: And the time and effort spent will be more than justified—for the resulting data leads to more efficient operation.

The fact is that practically no published data are available on rates at which foods freeze under actual operating conditions in commercial plants. Yet such data are of particular interest and usefulness to plant operators as well as designers.

Because of this definite need for reliable information on freezing rates, engineers at the Western Regional Research Laboratory have been conducting field tests of commercial freezers. The technics and procedures, as detailed, were found necessary to avoid interruption of usual plant schedule or disturbance of air flow in the test freezer. The methods were devised primarily for air-blast freezers in which the product is frozen in consumer packages.

Determining the Performance

In laboratory research on the freezing rate of food products, process variables, such as air velocity, air temperature, placement of test sample, etc., must be precisely controlled. Although strictly applicable only to similar ideal test conditions, the data thus obtained are nevertheless used for estimating or predicting freezing rates, especially in connection with the design of new freezers.

Data necessary for an analysis of air-blast freezer performance generally include the following: (1) Air temperatures, (2) piece center temperatures at package centers, (3) air velocities, (4) fan power consumption, and (5) static pressure drop across the fan.

The method of temperature measurement must meet these requirements: (1) There must be no significant interference with normal loading practices and air flow; (2) the temperature-sensing element must be very small and rapid in response; (3) readings must be satisfactorily accurate despite appreciable temperature gradients near the sensing element; (4) the method must provide for remote readings.

Of the various common methods of measurement, only that employing the thermocouple principle meets all of these requirements. The thermocouple wires are led from the potentiometer to the freezer (Fig. 1), where they are terminated as spot junctions, or are fixed to the jack side of jack-and-plug connectors.

Copper and constantan wires (conforming to the 1938 calibration tables of the National Bureau of Standards) are used to form the thermocouple circuits. The wires are installed in the duplex insulated form (individual wires are coated with enamel and the fabric covering is impregnated with lacquer).

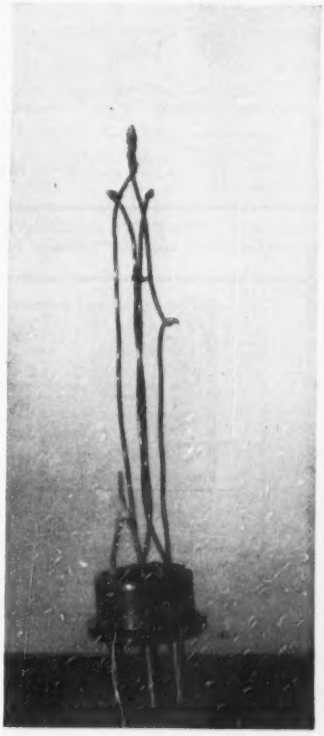
The wire used is No. 30 B & S gage, which corresponds to a wire diameter of 1/100 in. With suitable precautions, the heat conduction along these small wires is not sufficient to affect materially the temperature of the test junction or to increase significantly the rate of freezing of the packaged food. Wire of large diameter can cause serious errors through heat conduction. Since test installations are only temporary the leads are passed under the door seal.

Thermocouple circuits of the common-return type are not recommended for freezer tests. Instead, an isolated circuit arrangement should be employed.

Test Junction Located

When freezing rates of foods inside packages are being studied, the thermocouple test junction frequently is placed at the center of the package. With non-liquid packs, several of the food pieces are threaded close together on the lead, with the junction located in the center of the terminal piece (Fig. 2). The junction end of the lead wire is passed through the package overwrap and the side of the carton, and the food pieces are then put in place on the wire while the carton is being filled (Fig. 3). A hand sealer is used in closing the overwrap.

Regarding forming of the test



OF PRIME IMPORTANCE in the new technic is this heated-thermocouple type of anemometer used to measure freezer air velocities.

A Look At the Set-Up

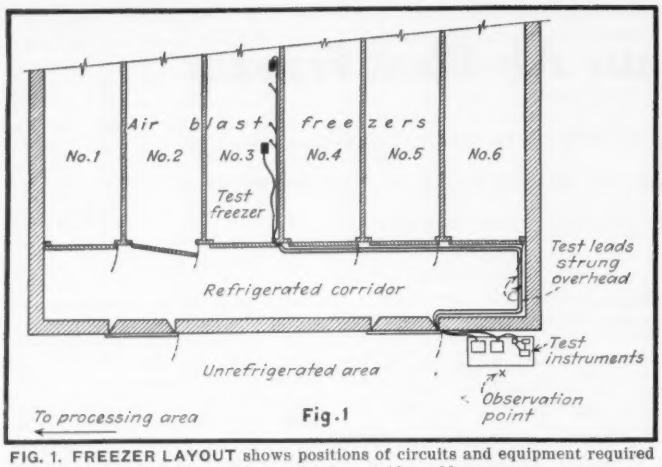


FIG. 1. FREEZER LAYOUT shows positions of circuits and equipment required for making tests. Observation point is outside cold area.

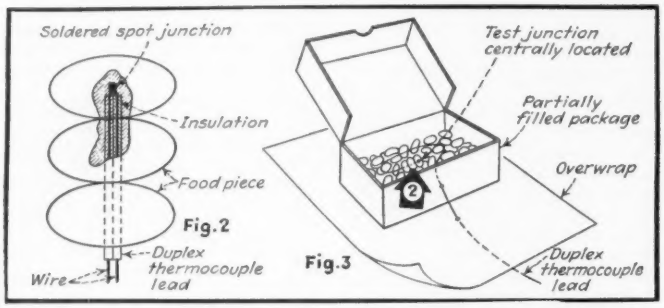


FIG. 2 & 3. FOOD PIECE containing thermocouple junction is placed at center of package, and adjacent threaded pieces lie along long axis of package.

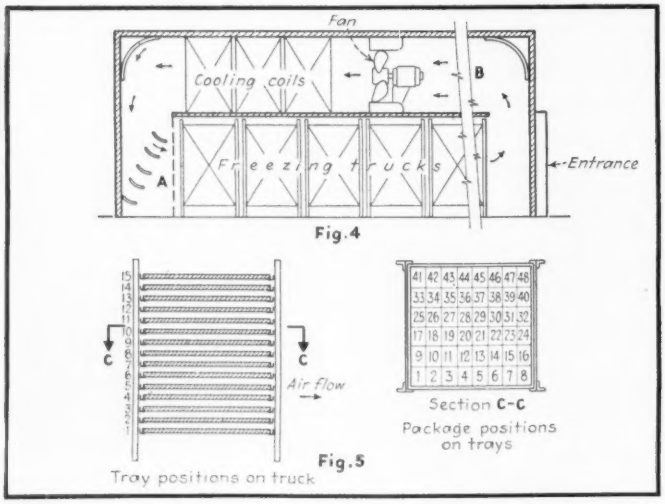


FIG. 4 & 5. HERE is general scheme for positioning trucks, trays and packages preparatory to gaging temperatures in the truck-tray air-blast freezer.

junctions, the magnified view (Fig. 2) shows a satisfactory form of construction. Lacquer or a coating of melted rosin can be used to prevent fraying of the fabric insulation at the end of the wire.

Test junctions must be placed in position while the packages are outside the refrigerated area. Thermocouple wires leading from each package are left about 10 ft. long, and insulated plugs are soldered to the ends of each pair of wires. These plugs facilitate connection of the package leads to the potentiometer leads. A sufficient number of jacks is provided at the freezer end of the potentiometer leads, and the plugs at the ends of the package wires are inserted into these jacks immediately after each truck is moved into the freezer.

The metallic parts of the jack-and-plug connectors should be made of the same metals as those used in the thermocouple wires. If other metals are used, spurious e.m.f.'s will be imposed on the circuits as long as the jack and plug are at different temperatures, and the result will be incorrect temperature readings.

In placing junctions for cooling-coil temperature measurements, thermal conduction losses through the leads must be avoided, and the actual junction between the thermocouple wires should be located on the pipe surface and not at an adjacent point in the air stream. Conduction losses are minimized by small-diameter wire, by close contact of the insulated lead with the pipe for a distance of several inches before the point of junction contact, and by protection of the lead as much as possible from the air stream.

Various methods can be used to fix the junction to the pipe. In temporary test installations, satisfactory results have been obtained by soldering or tightly taping the junction to the cleaned pipe.

Measurement Points Determined

Selection of measurement points for plant tests depends considerably on freezer design, loading practice, and size and shape of packages handled. Consequently, the distribution pattern differs from plant to plant.

Fig. 4 shows a truck-and-tray air-blast freezer of the cross-flow type. Assume that the packages are loaded on the trays (Fig. 5), that the trays are placed on the trucks (Fig. 5, left), and that the trucks are then loaded into the freezer (Fig. 4).

To compile data on the variation in freezing rates of packages on a given tray, the packages in which test junctions are located are placed in the least favored and the most favored positions as regards exposure to the

air stream. Package No. 30 (Fig. 5) is in a much less favorable position than No. 25 or No. 41. Such differences in position sometimes account for as much as a 2 hr. difference in freezing time (see Fig. 6).

The variation in freezing rates for different tray and truck positions is equally important. Therefore, test junctions are placed in packages in several tray positions, such as Nos. 1, 7, and 15 (Fig. 5). Also, the temperature histories are determined for at least the first and last trucks placed in the freezer. In some cases, it is advisable to set up for testing every second or third truck in the line.

For an analysis of freezer performance, the temperature of the air stream must be measured at several points. Test junctions are so located as to indicate the temperature of the air entering and leaving the freezing section—that is, at points such as (A) and (B) of Fig. 4. Junctions are also placed about ½ in. above the test packages, so that the air temperature at each package location can be determined. In some instances, it is desirable to locate test junctions in air bypass channels, for example between the trucks and freezer walls.

Data of considerable practical value are obtained by locating test junctions on the cooling-coil surfaces. Attempts usually are made to establish points of measurement at the top, bottom, and center of each coil.

Electronic Unit Used

The "nul" or "balance" type of potentiometer is used to measure the voltages developed in the thermocouple circuits.

The instrument found most suitable for our work was the electronic, multipoint recording potentiometer-pyrometer. A galvanometer is not used. Instead, the direct-current voltage of the thermocouple is converted to an alternating signal, which is electronically amplified and used to actuate a balancing motor. The electronic instrument is completely unaffected by vibration and does not have to be maintained in a perfectly level position.

Furthermore, this type of instrument can be constructed so that its sensitivity will be satisfactorily high even if the thermocouple circuit has a resistance of several thousand ohms. The electronic recorder is comparatively expensive, but where much test work is involved, the instrument quickly pays for itself through savings made in personnel requirements.

Much information of use in the development of improved designs and operating practices can be gained from the results of temperature measurements alone. However, for a completely rational analysis of freezer performance, considerable information pertaining to air flow and the air handling equipment is also required.

Air Velocity Measured

Although the general relationship between air velocity and freezing rate is predictable from heat-transfer considerations, available quantitative data on the subject are inadequate. Preliminary results from our field tests indicate that the freezing rate of food products is affected by velocity of the air over the packages to a much greater extent than is generally recognized. It might be well to emphasize that the velocity involved is not in the freezer, but that of the air immediately above the test samples.

Average velocities are many times greater than the velocity directly over the packages. Because of the wide variation in velocity and distribution of air in most freezers, and the significant effect of air velocity upon the freezing rate of the product, the ac-

Graph Lines "Visualize" the Performance

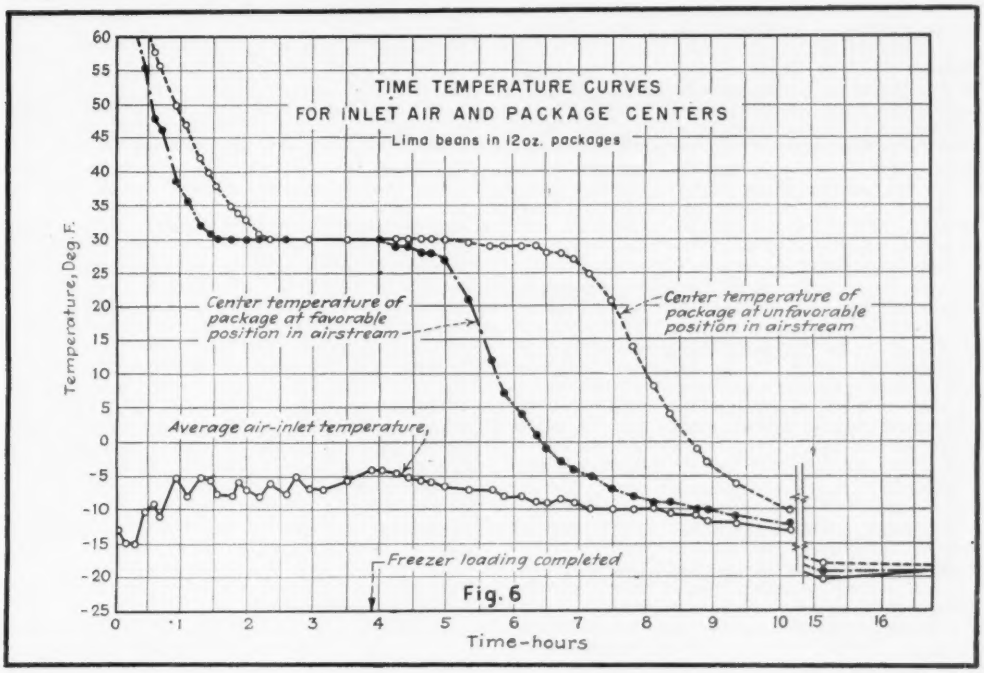

TIME TEMPERATURE CURVES
FOR INLET AIR AND PACKAGE CENTERS
Lima beans in 12oz. packages
Temperature, Deg F.
Time-hours
Center temperature of package at favorable position in airstream
Center temperature of package at unfavorable position in airstream
Average air-inlet temperature
Freezer loading completed
Fig. 6

FIG. 6. CURVES trace center temperatures of two packages—one positioned favorably, other unfavorably, in the airstream. Favored package cools considerably faster, as evidenced by 2 hr.-plus difference in reaching 0 deg. F.

curate measurement of air velocities is an important part of the procedure for testing commercial freezers.

To record the velocity data of primary importance—namely, velocity of the air immediately above the test samples—a special anemometer was devised.* Briefly, the sensing element consists of two thermocouple junctions in opposition, with one of the junctions heated externally by a coil of heating wire wound around the junction.

The difference in temperature between the two junctions is a function of the rate of cooling of the heated junction as affected by the velocity of the air moving past the junction. This difference in temperature causes a difference in e.m.f. between the couples, which is detected and measured by a standard potentiometer circuit. By application of different voltages to the external heating wire, it is possible to measure air velocities over a wide range.

The sensing element is mounted on a radio-type miniature plug. To measure velocities at various points in the freezer in rapid succession, several of these sensing elements are used simultaneously, the elements being connected to the potentiometer circuit through a multi-point selector switch.

Some of the advantages of an anemometer of this type are: (1) Velocities can be read remotely, eliminating the inconvenience of working at subfreezing temperatures for long periods of time. (2) Readings are not affected by the presence of the observer in the test freezer. (3) The sensing elements are small enough to be located in the space between the trays in the freezer, as well as between the various test packages on the tray.

Because of space limitations preventing use of long approach and leaving sections, distribution of the air flow in most commercial freezers is variable and erratic. For example, we have found that the air velocity in the same aisle in a freezer may vary by as much as four- to five-fold between floor and ceiling. In the test unit, the higher velocities were nearer the floor—as might be expected, because of the overhead location of the blower and the design of the duct work.

Accordingly, careful consideration must be given to the positioning of the velocity sensing elements in the test freezer. In general, the elements should be located so that the resulting data will indicate the general distribution of the air in the freezer, as well as the local velocity of the air immediately above the packages on test.

Of particular interest is the velocity, and therefore the relative amount, of air bypassing the trayed product. In the freezer, the air tends to bypass the trays via the space above and below the tray trucks as well as along the aisle space between the trucks and between the trucks and the two side walls. Experience has shown that by placing six anemometers at equispaced positions on the periphery of the trucks it is possible to record experimental data that will be indicative of the amount of air bypassing the trayed product in the freezer. This information is of particular importance in determining how much of the air circulated is being used effectively as a heat transfer medium.

Six other sensing elements are positioned so as to record the velocities of the air passing through the upper section of the freezer (which is of known dimensions). By averaging the velocities and computing the cross-sectional area involved, it is possible to obtain a reasonably accurate estimate of the total amount of air being circulated in the freezer. This information is needed to establish the operating point of the blowers or to check the operating point as established by other experimental data and the manufacturer's published rating.

In addition to the points of measurement already described, velocity measurements must also be made directly above each test sample, such as positions 25, 30 and 41 (Fig. 5). These data, together with the temperature histories of the various test samples, are required to determine the effect of air velocity upon the freezing rate of the food product. In addition, the velocity measurements made at these points are important as a measure of the amount of air actually coming in contact with the trayed product.

The procedure followed to locate the velocity sensing elements in the freezer required planning to minimize interference with normal plant operations. Prior to start of the test, the cable connecting the potentiometer and selection switch to the individual plug receptacles for the sensing elements is laid in place, with the receptacles located as close as possible to the points of measurement. The sensing elements are plugged in only as needed. As each loaded truck is pushed into place, the sensing elements located on, or attached to, the truck are plugged into their respective receptacles. The final connections are made in a matter of seconds, so that very little time is spent in the subfreezing cold.

During the tests, velocity readings are recorded periodically, with particular attention whenever a truck is pushed into or out of the freezer. At such times, the velocity distribution in the freezer is completely altered, with the result that all velocity readings undergo a change. This change, of course, should be recorded, along with a notation as to its cause. Normally, the velocity of the air in the freezer at any one point is reasonably constant, so that velocity readings need not be recorded too frequently.

Experience has shown that this test procedure gave data permitting an accurate appraisal of the effect of air velocity and distribution upon the overall performance of commercial air-blast freezers.

Fan Operation Studied

Measurement of fan-power consumption is quite simple, requiring only a wattmeter of the proper type and size. Readings need not be recorded continuously. A reading when the freezer is empty and one when it is full should be enough. Connections to the instrument should be made prior to the start of the tests. For convenience as well as instrument protection, the meter should be located out of the cold zone.

In addition to power consumption, there should also be recorded the current drawn by the fan motors when the freezer is fully loaded. This information is valuable for determining the added load the motors can carry.

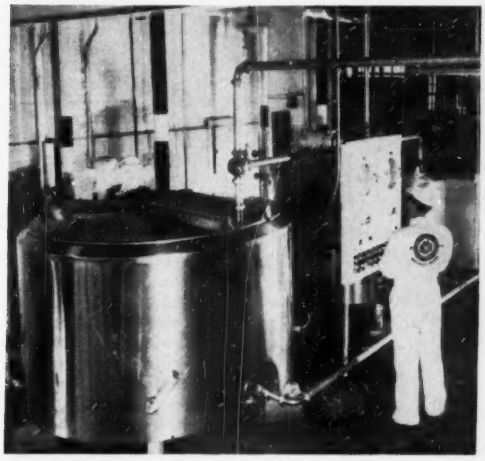
The static pressure drop across the blowers is measured by means of an ordinary U-tube manometer and two static pressure heads. Each head consists essentially of: (1) A short length of copper tubing, with a circular sheet-metal plate pierced, centered, and soldered to the open end of the tubing and (2) A second solid circular plate spaced about 3/16 in. away from the end of the tubing. The two plates eliminate any velocity component in the static pressure measurements.

One of the heads is located at the fan suction and the other at the fan discharge, with rubber tubing connecting them to the manometer located at the test station. Manometer readings are taken periodically to note changes in static pressure as the number of trucks in the freezer is varied during the run. The static pressure readings help to establish the point of rating for the fans in the freezer.

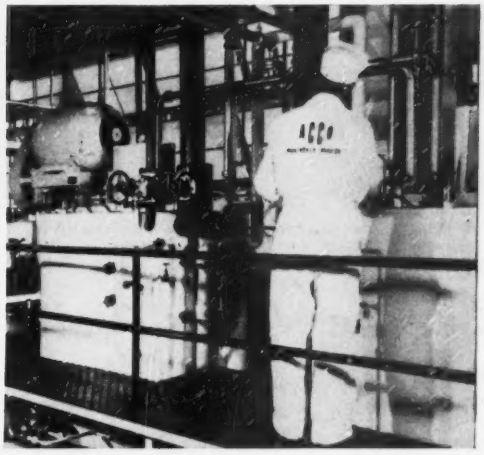
Properly interpreted, data from these tests provide the information necessary for an intelligent analysis of the performance of an air-blast freezer. Although devised primarily for research studies of certain commercial freezers, the technics and procedures described here can be used to determine the operating characteristics of any freezer using air as a heat-transfer medium.

* Love and J. R. Hawes, "An Improved Heated-Thermocouple Anemometer for Use in Air-Blast Freezers"—Food Technology, Vol. 3, No. 7, p. 241, July 1949.

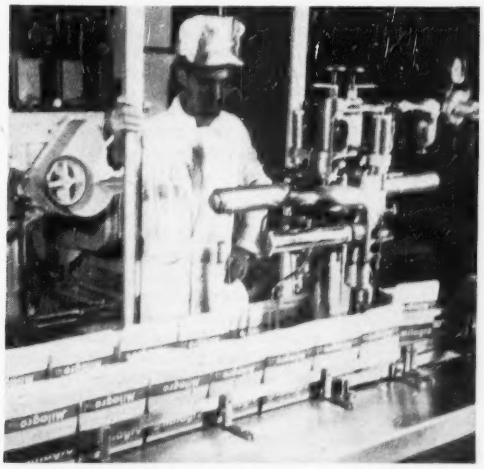
LATEST technics, finest equipment are combined in modern $2,000,000 26-acre facility just launched by ACCO at Monterrey. It is turning out shortenings, margarine and salad dressings for exclusive sale in the Republic.



SPIC-AND-SPAN stainless steel tanks are used in pasteurizing milk going in vitamized margarine.



ALL-WHITE churns of newest type mix ingredients for making the margarine. Note efficient layout.



HERE, "Milagro" (Miracle) is automatically weighed and filled. It's a cottonseed-oil shortening.

Mexico Now Boasts "Ultra" Food Plant

STRIKING STIMULATION of Mexico's economy is forecast with the recent opening, at Monterrey, of the modern, $2,000,000-plus food processing plant pictured on this page.

Employing the latest equipment and technics, it is now manufacturing a variety of products—such as hydrogenated vegetable shortenings, margarine, cooking and salad oils, mayonnaise, salad dressings, and peanut butter. And annual product capacity is put at 50,000,000 lb.

All of the foods will be sold exclusively in Mexico, thus contributing substantially in the trend to raise nutritional levels. The new operation is almost entirely operated by Mexican personnel.

Anderson, Clayton & Co., Inc., internationally known

(*Turn to page* 174)

Speed and Flexibility Are Specific Needs

ON FELIN'S new bacon-wrapping line, high-velocity machine (top) cuts slabs at rate of 800 slices a minute. Strips are assembled into 1-lb. and ½-lb. units. These are then wrapped both by machine and by hand.

Service Means Profit—If

This Philadelphia meat packer gave plenty of the former. But he found it took something extra to make enough of the latter. Here's how he put his finger on—and added—that extra something

JOHN V. ZIEMBA
Assistant Editor, "Food Industries"

Top-notch service was always the trump card at John J. Felin's Philadelphia pork packing plant. But the day recently arrived when economic factors—climbing costs of labor and materials, rising competition, and the like—began to take their toll in the ledger book.

Problem was to find what was needed to strengthen the company's position. And it's notable that the executives were not satisfied with mere posing of the usual questions. They kept constantly at it and got a number of pertinent answers. In short, they didn't stop until their strong spotlight had covered all phases of their packing operation. Then, with their analysis complete, they unhesitatingly went ahead to fill the requirements indicated.

The terse evaluation of President Wells E. Hunt tells the story:

"We saw that we had two things in our favor: First, because our plant is located at the point of distribution, time between processing and consumer purchasing is very short. And this means products are at their maximum 'bloom' or freshness when the consumer gets them.

"Second, our operations can be adjusted to help the retailer. If he is caught short by underestimating his needs, we do not let him down. Since our plant is at point of sale, we can quickly conform our operations to the retailer's requirements.

"When, for example, demand slackens, the livestock kill is slowed down accordingly. Thus, there is no glut. And freshly-prepared products once more move to the retailer when demand again picks up. Conversely, sudden up-surges in demand can be immediately met, as they occur, with fresh products—at the point of demand. Yes, our operation put us in a position of distinct advantage.

"But it had now become quite obvious that we also needed something else—that is, highest efficiency of operation in order to maintain this service with a satisfactory margin of profit.

"It became evident that to get such efficiency demanded considerable modernization—advanced equipment, improved technics, straight-line production in all four phases: Pork cutting, curing, smoked-meat washing, and packaging."

Efficient Pork Cutting

Bending every effort, the company got just that. Under the direction of Plant Superintendent H. E. Sparks, the pork-cutting line was arranged for straight-line output. A completely new installation was set up, providing a cutting line giving greater efficiency and more uniform cuts—loins, hams, picnics, bellies, and Boston butts—in proper yields.

There are other plus-factors arising from this revised layout. Personnel find their work easier and less hazardous. The company also reports that a

10 percent reduction has been attained in the number of workers required on the line. Help thus saved has now been shifted to other jobs, such as ham boning and sausage material boning.

Nor is this all that was done to improve efficiency. Costs were cut by the installation of wrapping operations on the cutting line. Formerly, loins, picnics and Boston butts were loaded into trucks, which were then pushed aside, the cuts being wrapped later. Now the cuts are wrapped right on the line and directly taken to shipping.

Soon, additional wrapping stations will be installed to package feet, neck bones and spareribs as they come off the line. Thus, operating economies will offset climbing costs. And trucks containing these items will no longer clutter up the cutting room and shipping department.

Hogs are delivered by overhead chain conveyor from coolers to a cutting belt with workers on each side. Hams are cut from the carcasses by hand. Shoulders are removed with a circular knife. Front feet are taken off by a power saw. And loins are scribed—a circular saw is run between belly and loin to pull the loin.

Next, the loins are trimmed to the right shape and amount of fat. Then they are hand-wrapped, loaded into trucks, and delivered to shipping.

Farther along the line, the neck bone is cut from the shoulder. Picnics are separated from butts by circular saw, and both picnics and butts are wrapped and delivered to shipping.

Final step is preparation of the bellies for curing. A machine consisting of two cast-iron rollers flattens the bellies so that they can be trimmed and the ribs removed. Bellies are finally chuted to the curing cellar.

Hams Chuted to Skinning Line

Parallel to the cutting line is the ham-skinning table. Hams are chuted from the pork-cutting line onto a traveling 20 x 2-ft. belt, alongside of which men skin them with draw knives. Saddles hold the hams in position during skinning. Directly in front of each skinner are hot water boxes into which knives are dipped to enable more efficient skinning. Finally, skinned hams are chuted to the curing cellar.

New easily cleaned curing boxes have been installed. These improve the quality of the bacon. The old stationary concrete pickle-cure vats, which held 3,000 lb. of bacon, have been replaced with dry-cure galvanized iron boxes. A bolted cover on each box exerts pressure on the bacon so that it may be cured in its own juices. These boxes hold 850 lb., are portable, and can be stacked two high. They are more sanitary because they can be steamed readily.

Three Key Changes That Stepped Up Operations

WRAPPING STATION right on line reduces handlings. Loins and butts are wrapped the minute they're cut, go directly to shipping truck (right).

HANDY, PORTABLE dry cure boxes replace stationary concrete vats. New boxes are easily cleaned, can be stacked two high.

SPECIAL sliced-bacon line will accommodate hand or machine wrapping as needed. Here, girl weighs packs. Unit (left) wraps. Remaining bacon continues down line, where girls hand wrap.

And then there is the line on which smoked meats are washed, scraped, branded and stockinetted. Higher efficiency on this line has been attained by two changes: First, a stainless steel mesh conveyor, 30 ft. long and 1½ ft. wide, has been installed to deliver cured hams, boneless butts, bellies and picnics to the different stations. Second, an automatic washing unit has been built.

The washer housing consists of a stainless steel box directly over the conveyor. In the center of the box are three sets of high-pressure water sprays—one on top and one on each side.

Hot and cold water are pumped into the water sprays from two lines. Both lines are automatically regulated so that the temperature of wash-water can be set to about 140 deg. F.

Coming out of the automatic washer, the cured meats pass on to the other stations, where they are scraped and branded. Hams, picnics and butts are stuffed into stockinettes that are stapled. Bellies are hooked onto combs, ready to be hung on smoke trees.

3-in-1 Wrapping Line

Flexibility keynotes the company's smoked meat wrapping line. A diversity of products—hams, bacons, picnics and boneless butts—are handled on one line. And three different items can be wrapped at the same time.

This line consists of a 1-ft.-wide by 25-ft.-long stainless steel band conveyor that carries the smoked meats past the various stations.

Smoked hams and picnics are handled in the same manner, except that wrapped hams are machine-tied and picnics are hand-tied. Stockinettes are first removed from both. Next, the meats are double-wrapped in greaseproof papers and string-tied. And finally, each item is individually weighed.

Combs are removed from bacon slabs, which then are double-wrapped, string-tied by hand, and weighed.

Special equipment is now used to wrap boneless butts. After stockinettes are removed, the conveyor carries the butts to special new Moldart wrap and twist machines. The wrap machine provides a sheet of cellophane, water being spread on the sheet as it passes through a set of rolls. The water causes the film to shrink and conform to the shape of the butts. A sliding knife, manually operated, cuts the sheets to size. Then, the butts are hand-wrapped and again placed on the conveyor that takes them to the twist machine.

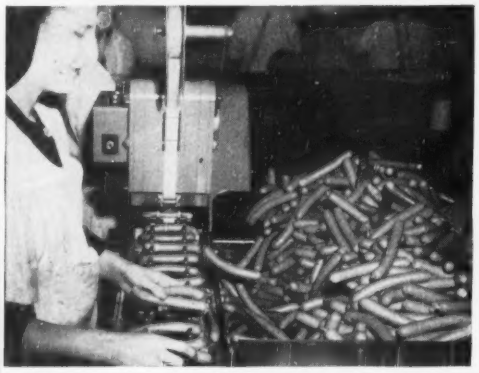
This unit spins the ends of the cellophane so that there is a close adherence between film and butt. The machine has a 3-in.-wide endless rubber belt that turns to make the twist as the operator applies the butt on the belt, holding both ends of the wrapper.

New Frank and Sausage Line

Another packaging line "doubles" for frankfurters and link sausages. Franks are put up in an attractive and

(*Turn to page* 173)

Packaging Line "Doubles" for Franks and Sausages



FED IN by conveyor, franks are delivered to machine that bands them, cartridge-like, in units of ten.

BANDED FRANKS go to wrapping unit, where cellophane is manually applied. Then they are put on conveyor.

SECOND MACHINE twists ends of cellophane to form a distinctive, round, 1-lb. frankfurter package.

SAME LINE is also used for link sausages. Operator fills sausages into bags with this special filling unit.

WHEN MIXES are leavened by special phosphate, doughnuts of superior quality and appearance result. Doughs are easily handled by automatic machines. Seen is experimental run in Food Technology Laboratory, Monsanto Chemical Co., Anniston, Ala.

It's a Chemical, True Enough But Foods Are Better With It

This versatile agent—phosphate—leavens and enriches cereal products, acidifies soft drinks and jellies, helps emulsify cheese, acts as an antioxidant in fats, and "anticakes" salt and sugar

ROY E. MORSE and THEODORE W. SCHILB

Technologists, Food Technology Lab. Monsanto Chemical Co., Anniston, Ala.

In recent months, much adverse criticism has been leveled against the use of chemicals in foods. Their use to conceal inferiority is not to be condoned, and will not be further discussed here. But the part played by chemicals in *supplementing* foods should be further discussed and highlighted as progress is made by food technologists, nutritionists and chemists in cooperative effort. The public education phase of this work has lagged far behind the technological advances.

Much good work has been done to retain the full nutritive values of fresh foods processed for preservation. This work includes development of improved processing methods for retention of original nutrients, and is best exemplified by the informative (and costly) program advanced by the canners.

Another equally important phase of this work has been the return of nutrients that were removed during processing to comply with consumer preference for refined foods. An example of this is the bread and flour fortification program that has been encouraged by the milling and baking industries.

As further evidence of the transformation that food processing has undergone, manufacturing methods have shown a gradual and progressive change. The heavy emphasis upon engineering, quality and sanitation which is apparent in present day food processing has produced an inherent complexity which must lean even more heavily upon the shoulder of the technical man.

These complexities have also been felt in fields of chemistry which relate to the food industry*. For the union of the chemical industry to the food industry has many facets, details of which are beyond the scope of a single article. Consequently, only one field of chemistry will be discussed here—the phosphates.

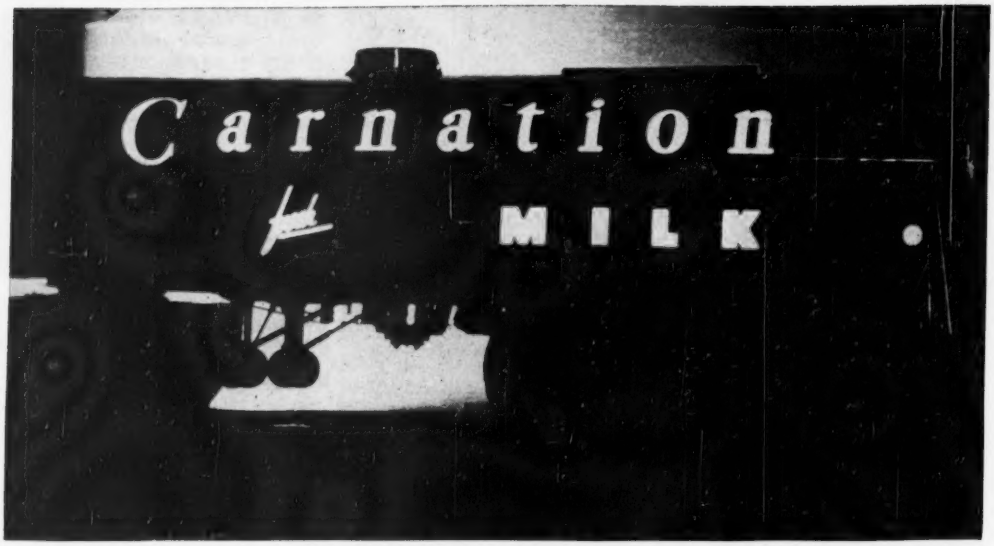
Long Used In Baking

One of the largest outlets for phosphates is the baking industry, where they are used as leavening acids in baking powder, self-rising flour, phosphated flour and prepared mixes for home and bakery. Monocalcium phosphate as a chemical leavening was first introduced in 1856, but baking powder, as we now know it, was not put on the market until 1892. It remains one of the leading leavening acids in use today, but the current technics of manufacture are a far cry from early methods, and great improvements have been made in the products' purity and physical form.

A comparative newcomer in the leavening field is sodium acid pyrophosphate. Introduced in Europe in the early 20's, its use spread quickly to this country. Sodium acid pyrophosphate is largely used in the preparation of slack-dough products, such as cakes and doughnuts, where its slow

(*Turn to page* 175)

* An indication of this growing association has been manifested at the Monsanto Chemical Co., supplier of adjunct chemicals to the food industry for a great many years. Here, it was found advisable to set up a laboratory with the entire efforts devoted to food technology. The function is to investigate the many phases of the food industry where chemicals are currently employed to facilitate processing, and to investigate possible improvements in food quality that may be brought about by the application of new chemicals.



LETTERING on this tanker has round-the-clock effectiveness because it reflects any approaching light.

Borrowed Light Lends Safety After Dark

Luminous decals not only increase advertising value of truck's sides and rear, but also add highway protection during night hauls

Special luminous signs—decals—are proving of exceptional value for safety as well as advertising when used on trucks and trailers that operate partially or wholly at night. Such operations include retail milk and bread routes, the transfer of bottled milk between pasteurizing plants and retail branches, the pick-up of fresh milk in cans from farmers, the transfer of bulk fresh milk in tank trailers between cities, the night distribution of groceries, meats and vegetables from warehouses to retail stores, and many similar food movements.

When used on the fronts or rears of trucks operating at night, the luminous decals derive their safety value from the fact that they are "picked up" much sooner by the headlights of approaching vehicles. Being "picked up" sooner means that the drivers of the approaching vehicles see them quicker and thus have more time and distance in which to pass safely.

Reflection is the answer. In short, the luminous decal sign can be seen sooner and at a greater distance away than a sign made with ordinary paint because of the reflection instead of the absorption of the light striking the decal. This characteristic is obtained through the use of reflectorizing materials in the manufacture of the decals.

The decal's greater advertising value at night, as compared with signs made with ordinary paint, arises because they "come alive" through their reflection of all free light striking their surfaces.

Steady Development

Truck-sign art has come a long way since the first recognition of the advertising value of the truck body. First came mere company names, then there began to be added many embellishments—trademarks of the company, reproductions of the products themselves, and the like.

All these names, trademarks, and products were painted on the bodies by hand. Hence, there were required the services of skilled artisans. The jobs were expensive. Although protected against the weather by covering coats of shellac or varnish, there was still damage due to rubs, scratches or dents —calling for repainting by the expensive hand method. Then there came something new: The use of decalcomania transfers—"decals" for short. Reproducing the desired lettering, trademarks or signs, and painted in the proper sizes, shapes and colors, these were made in quantities and attached to sheets of paper for protection, handling and storage until they were applied to the body surface by the transfer method of washing off the protecting paper with water.

Because an almost unlimited number of reproductions can be made from each original painting, the cost of a decal in a quantity job is much lower than that of painting the same trademark, sign or name by hand. On this quantity basis, some decals can be purchased for one-fifth the cost of duplicating the work in a paint job.

This difference between the cost of decals and hand painting varies, depending upon the intricacy of the design itself and the number of such designs required. Of course, if only one were required, the hand-painted design

would cost less, since the principal cost of decal making is in the production of the original. It is much the same as in photography, where the cost of developing a film is more than the cost of a print subsequently made from the film.

If a fleet owner needs only five or ten signs for his trucks, decals are not for him. But if he needs 25 or 50 or more new ones a year, or relettering jobs, then the decals are so much cheaper per unit that there is no comparison in cost.

This led to broad acceptance of decals for relettering the large food-field fleets. The subsequent step was to reflectorize the decals for trucks operated partially or wholly at night.

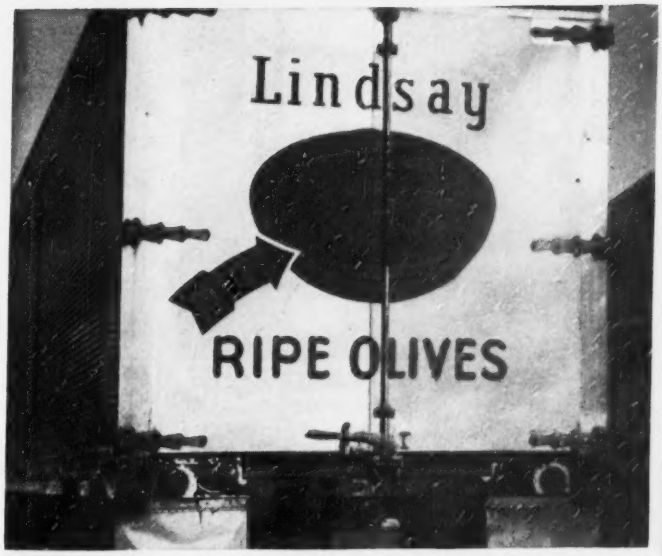
To date, most of the new reflecting decals have been produced through the use of the patented process of the Minnesota Mining & Mfg. Co. of St. Paul, Minn. This process includes the use of plastic glass mixed in the paint from which the decal is made.

Millions of minute and perfectly-formed glass beads reflect light from headlights and other sources of light to produce the effect of a brilliantly-illuminated sign, visible from almost a 180 deg. angle. When the light strikes the decal head on, the brightest reflection is obtained.

The Minnesota Mining & Mfg. Co. product is known by the trade name of Scotchlite. It comes in rolls of various colors and is quite thin. Most of the colors are suitable for reflecting signs.

According to one user, the Lindsay Ripe Olive Co. of Lindsay, Calif., the light silvers, grays and greens and blues, yellows and reds are outstanding.

The Lindsay signs are cut from a roll of Scotchlite and glued to the trailer surface. In the sign employed, olives shown in a bowl are painted



IMPRINTS of a product or a trademark do not add materially to the cost of the decals—but the fleet must be large enough to justify the method.

black over a silver reflecting base so that only the outlines show.

The company says that its signs have stood up well under the climatic conditions, including rain, snow and mud. It is pointed out that care should be used in washing the surfaces so as not to wet the signs too much or rub too hard while wet. Soap can be used to remove road film.

The company further states that for best night effects the background surrounding the sign should be a dull, non-reflecting surface. Otherwise, considerable glare is set up which detracts from the sign's effect.

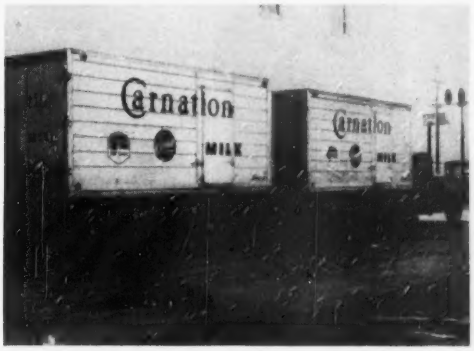
It is further indicated that for optimum results, the sign should be as near the light level as possible. Curved or other than direct reflecting surfaces should be avoided in locating the sign on the vehicle.

The trailer surface has been effectively utilized by the Carnation Co., which is using luminous decals on 30 of its night running over-the-road carriers. The first of these signs was put on in 1944. Some of the trailers are the closed panel type and others are tankers, which pick up fresh milk at the farms during the night.

Where comparatively few signs are required, the user may purchase the regular material and follow the cut-paint-and-glue procedure. But where 50 or more signs are needed, this method would not only be tedious but also too expensive.

Decals show up sharp, both night . . .

. . . and day



SAFETY aspect of these luminous decals stands out clearly in night picture (left), while there is no impairment of daylight display value on the trailer sides and rear for the promotion of the company name and product.

1 **BIG TUNA** is hauled into one of Gloucester sheds. It's shipped to Portsmouth for processing.

2 **GRINDING** in a large meat grinder is the first processing step in producing "Friday Franks."

HOT DOG—IT'S TUNA

Processing provides special fish-filling for newcomer to ranks of canned foods

CONFINED to New England and parts of New York State since their first appearance in December, the tuna frankfurter will join the ranks of nationally distributed canned foods during the coming months.

Dubbed "Friday Franks" by their packers, Davis Bros. Fisheries Co., Inc., Gloucester, Mass., the product is the result of a formula devised jointly by a Boston attorney and a manufacturer of meat spicing compounds. At present, the franks are being processed at Portsmouth, N. H., and canned by the Davis company at Gloucester. They are similar to the accepted "hot dog" in meaty taste and have also held up through market tests in keeping qualities and appearance.

Should these tunafurters strike a popular vein, the tuna will take on a new look among fishermen. For a long time, the prices brought by the big fish were hardly worth the time and damage to nets involved in catching them. The price of this fish, in the New England area, had already jumped from around 2c. to 7½c. a pound, in early January. (Wide World photos)

3 **GROUND FISH** now goes to next machine for fine chopping and blending of spices and shortening.

4 **COMPRESSED AIR** stuffing machine fills cellophane casings. Smoking completes seasoning job.

5 **LAST STEP** is removal of cellophane jackets, prior to shipping back to Gloucester for canning.

We Think . . .

▪ Conference Gives Clues to Future Farm Policy and Costs

Since raw material costs of food processors are affected by the nation's agricultural policy, what happened at the recent Des Moines farm conference is of interest. From this meeting came some clues as to what the farm policy may be after the inevitable compromises are made.

The supporters and opponents of the Brannan Plan both agreed, directly or indirectly, on these points:

1. The government should support farm prices.

2. Acreage allotments and marketing quotas can be used effectively to control production. (This does not square with experience, but neither side questions it.)

3. Price-supporting loans and purchases should be continued on basic commodities such as wheat, corn, cotton, tobacco and peanuts. (Brannan later may include these "basics" with perishables in his scheme of letting prices go where they will.)

The two factions disagreed in these respects:

1. Brannan favors direct subsidy payments on perishables. His farmer opponents want prices supported by purchase and storage.

2. Brannan wants high support levels continued. His opponents would like them lowered.

Some interesting cost estimates were tossed around at this meeting, too. Farm Bureau President Allan Kline quoted G. S. Shepherd, price expert at Iowa State College of Agriculture, who puts the cost of a 1949 Brannan Plan program for potatoes at $312,000,000, or more. But Brannan claims that $25,000,000 would have done it.

As usual, Brannan does not explain his calculations. Shepherd does: Without government buying, potatoes would have sold for less than 90 cents a bushel. So the government would have paid farmers the difference between that and the $1.59 support level.

Farm spokesmen estimate that Brannan's support level of $19 a hundred pounds for hogs would have cost $500,000,000 in subsidy checks last year. Yet without the plan, farmers generally sold their animals at a profit.

These spokesmen also quote A. R. Bartlett, University of Illinois dairy economist. He estimates that dairy products under the Brannan Plan would entail subsidies amounting to $1,484,000,000, a year. And if all American farmers were subsidized at that rate, the cost would be a cool $19,000,000,000, annually.

There you have both sides of the question. Now suppose that Brannan wins, but his opponents turn out to be right about costs. It's something to think about. The piper would be paid largely by levies on business, it being poor politics to make the masses pay higher taxes. Remember, too, that our government already is running heavily in the red, and in prosperous times at that.

How much more taxes can corporations pay and still finance industrial progress?

▪ Dairy Industry Headaches May Be All for the Good

Current events continue to bedevil executives and technologists in the great dairy industry. Butter makers are worrying about two fairly new tests used by the Food & Drug Administration as the basis for seizures. These are water insoluble acid and butyric acid tests which indicate the condition of cream used in making the butter. As little as 2 percent cheesy, or slightly rancid, cream puts the butter in the unacceptable category. Previously, F&DA tests were based principally on sediment and mold.

If it's any consolation, tougher quality tests by F&DA have in the past worked out to the long-range benefit of the industry concerned. But they call for forced-draft progress in quality control in the processing plants.

As a matter of fact, more rigid control of butter quality will help the product meet competition from colored margarine, uniformity of quality being one of butter's prime assets. And in the 16 states still prohibiting the sale of colored oleo, the dairy industries would improve their public relations tremendously if they ceased to oppose repeal of restrictive legislation and took free oleo competition in stride.

Dairy companies would profit more from consumer goodwill than from legislated competitive advantages. Some politicians would like to see the fluid milk business declared a public utility and be put under close state regulation. And in one town, in New York state, a project is under way to put the milk plants under municipal ownership and operation.

So anything can happen—unless the industry wins the people to its side.

▪Executives—Not Accountants—Should Chart Business Course

Where one's life is concerned only with impersonal things like figures, it is easy to develop thought patterns that seem absolutely correct—except that they aren't.

Take some recent discussions before the National Association of Cost Accountants as an example. How to determine the break-even point of a business was under examination. Even the most cantankerous would applaud the concept that "fixed" costs should be considered as variable. That is, they should be considered for the following five conditions: Complete shut-down, stand-by, 1-shift, 2-shift and 3-shift operations.

But there is a departure from realities when the cost accountants get into the field of business budgeting and, by implication, assume that sales volume can be computed far in advance.

Many an error has developed in this area during the past two years. Fortunately for business in general, the error was one of under-estimation, rather than over-estimation, of sales volume. Executives of even the best managed corporations could hardly believe the good news when sales figures ran way above predicted volume month after month.

The function of the cost accountant is indispensable. But management must continue to make its own calculations—aided, of course, by cost analyses. Just as it is pos-

sible to steer a boat in a straight course by looking backward at its wake, it is theoretically possible to guide a business on a straight course by the retrospective figures of the cost department. But the captain of a ship keeps a sharp lookout ahead.

With the dependence of the food processing industries on agricultural raw materials, the problems of management become particularly difficult. There are many factors which are outside the province of cost accounting: Weather, crop yields, crop quality, economic legislation, foreign currency valuation, imports, and results of research and development by competition. And these can knock into a cocked hat all the best calculations from an inside office.

Then, there is the touchy matter of wholesale layoffs when a cost-accountant's analysis indicates a need for substantial cost reduction. Always a distasteful job, it is easier discussed than accomplished. Witness the repercussions to a big layoff in the Boston region in the early months of this year. Many stores announced boldly they were not carrying the goods of the company that made the notable "economies" by large-scale dismissals.

Attitudes of the body politic have changed dangerously in recent years—in a manner that few figure-minded men can safely evaluate.

The cost-accountant's recommendations and figures are more akin to the compass by which the ship is steered than they are to a hydrographic chart or sailing orders. Still, there is much good in the thought-provoking intellectual speculation of the figure-minded man—provided top management is aware of the larger realities of life.

▪ On Second Thought, French Anti-Cola Bill Not So Funny

This one may give you some laughs, though its import is disturbing. A bill directly barring Coca-Cola from France recently passed the French National Assembly. This screw-ball action came on the crest of a cuckoo propaganda campaign which tossed out such gems as these:

"The Coca-colonization of France is a pernicious economic invasion of France and a vehicle of United States imperialism."

"Coca-Cola constitutes a mortal danger to our wines and to all hygienic French drinks."

"The moral landscape of France is at stake."

"The French consumer will get Coca-colique."

And a conservative newspaper came up with this one:

"Coca-Cola advertising is comparable to the totalitarian propaganda by which whole peoples have been intoxicated."

French wine makers teamed with the Communists to put the anti-Coca-Cola bill across. When the French are thirsty, the vinters expect them to drink wine. And the Commies know that Coca-Cola is as American as Uncle Sam himself. Therefore it is as much to be feared as the hydrogen bomb.

But how can a democratic legislature be so stupid? It must not be easy. The Coca-Cola sold in France is bottled locally, and the concentrate comes from a plant in French Morocco. There is no loss of dollar credits involved. And the beverage gives France another popular product, the bottling and sale of which creates employment and produces business profits.

'Tis funny, indeed. But the joke is spoiled by the realization that anything anti-American and pro-Russian can happen in France.

P.S.—Coca-Cola apparently didn't injure the health of two generations of American soldiers who saved France in World Wars I and II.

▪ Fresh Apples Have Become a "Processed" Food

Two recent reports by agricultural investigators emphasize the extent to which food technology is being applied. Both of these deal with apples. Together, they seem to demonstrate that the food technologist must take a much larger share of responsibility in the fresh fruit business.

In one of these investigations, conducted in Virginia, the emphasis has been on the need for quick removal of natural heat from the apple when it comes to the receiving station. The storage life of the fruit is tremendously increased by quick cooling. This accounts for the existence in the Virginia apple country of plants with 2,500 tons of mechanical refrigeration. These can handle over 400,000 bu. of apples per day during the picking period. Even that is not enough to give the optimum storage life.

Studies in the Northwest have quantitatively demonstrated the importance of better cooling facilities. Apples held at 70 deg. F. for one week after picking lose 9 weeks of storage life. Even if the fruit is held at 53 deg. F. during the first week, loss of storage life is one month. Apples promptly cooled to 30 deg. F. should keep 280 days.

Only with adequate cooling and cold storage is there complete justification for such operation as washing, waxing and control of storage atmosphere, which are done to make good apples available anywhere in the United States at almost any season.

Quick cooling of apples is one of many things that food engineers of tomorrow will do to make better fresh foods available the year around.

▪ Million Dollar Gift Will Set Stage for Progress

Food technology has received a notable stimulus in the gift of $1,000,000 to Massachusetts Institute of Technology by Campbell Soup Co. This gift is to be used for constructing a new building to house the departments of food technology and biology. Food technology has been located in a wartime temporary building and badly needs the new quarters which the Campbell gift will provide.

Buildings and equipment alone do not, however, insure a greater development of food technology, for men with great minds are also needed. It is hoped that MIT's other resources can match the Campbell contribution and provide ample qualified additional personnel to carry on the work and tradition started by Samuel C. Prescott, "dean of food technologists" and first president of the Institute of Food Technologists.

Food technologists and processors—not to mention consumers—owe the Campbell management a vote of thanks. And processors can help to make the generous grant pay maximum dividends by utilizing the new facilities it will make available.

PRACTICAL IDEAS

Three Belt Conveyor "Twists"

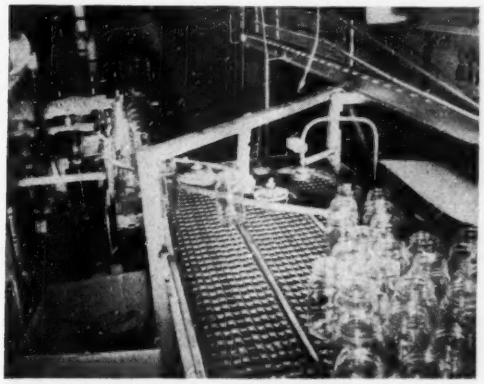
Operations on belt conveyors have been greatly improved through three innovations at the Taylor Reed Co., Glennbrook, Conn.

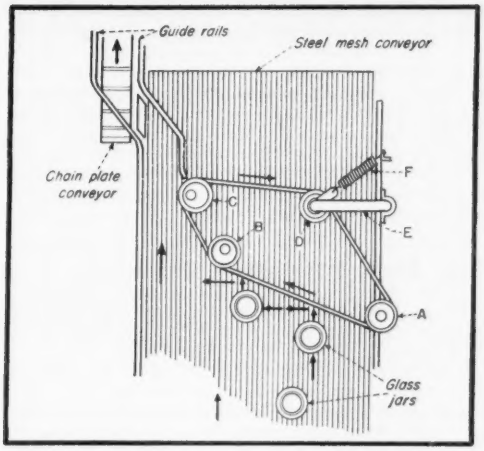
All three concern open-mesh metal-type conveyors. Two deal with transfer of containers, and the third, the driving of the belt proper.

Device Improves Conveyor Feed

In the first instance, glass jars are fed individually to a single file chain-plate conveyor from a group advancing abreast on a wide open-mesh conveyor. A unique travelling-guide V-belt assembly does it.

Here are the details: When metal or glass containers are emptied onto a feed conveyor, they advance as an irregular group (see photo). Hence, lining them up into single file to feed into the first machine involves a problem. Especially is this true if the containers are glass and the sizes are changed frequently.





SINGLE-FILER in action (top) and in diagram (above).

$25 EXTRA FOR BEST ITEM

You are invited to submit items for this "Practical Ideas" department. You will be paid at regular rates when your item is published, and if it is judged the best for the month, you will receive additional pay of $25.

Selection of the best contributed item will be made by a group of 200 readers each month, and the name of the author and item title will be cited in these pages.

"Practical Idea" items may describe any type of device or method recently developed to solve a problem, speed an operation, or make some task easier. The item may concern factory, laboratory, warehouse, or power-plant operations in the food industry. "Practical Ideas" pertaining to management, maintenance, and trucking or shipping also are suitable.

You need not be an experienced writer or draftsman to submit "Practical Ideas" items. The text will be edited and sketches converted to finished drawings.

Send your items to: "Practical Ideas" Editor, FOOD INDUSTRIES, 330 W. 42nd St., New York 18, N. Y.

Usually some type of gate or guide is angled across the conveyor to direct the containers to a one-at-a-time outlet. Here a problem is encountered, because the conveyor moves in one direction, while the containers must move not only with the conveyor but also across it to enter the single file line.

This problem was nicely solved through the use of a V-belt traveling diagonally across the conveyor around suspended eccentric sheaves. Four sheaves are used to obtain the correct action of the belt to move the jars in line for exit onto the chain-plate conveyor feeding the jar washer.

Diagram shows, in plan, the component parts of the device and how it operates. (A) is the drive sheave. (B) and (C) are eccentric sheaves of slightly different diameters. The (D) sheave is mounted on an inverted U-shaped arm (E) pivoted in a bearing attached to the conveyor frame. A spring, (F), attached to the arm and conveyor frame keeps tension in the belt as it travels around the sheaves. The entire assembly is suspended above the steel mesh conveyor, allowing the conveyor to travel beneath without touching.

This arrangement guides the jars in orderly manner across the steel mesh belt and onto the single-file chain plate conveyor—with little jamming and with very few jars overturned or broken.

Transfer-Assembly Prevents Toppling

To prevent glass jars from turning over when transferred between two conveyors traveling at right angles, the company has installed at the junction, a simple device.

A flat transfer plate is required between the two conveyors. On the entrance side, this plate must be lower than the feed conveyor and level with or slightly above the second conveyor.

When a jar slides onto this plate or is pushed from it onto the second conveyor by the following jars there is a risk of the jar falling over. The company has overcome this hazard by installing an assembly as described below.

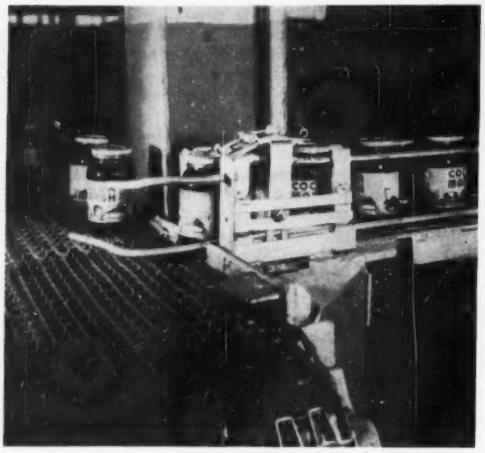
Three links are removed from a discarded chain-plate conveyor belt. The underneath side of the center link is welded to a length of strap iron bent to fit over the feed conveyor in the form of an inverted U. The U-shaped

BEST ITEM—Voting by reader-judges on Practical Ideas in February FI named as best the item, "Safety Device Avoids Hoist Overload." —The Editors

strap is slotted at both ends to permit travel up and down on bolts.

Two horizontal straps, welded to uprights attached to the guides on both sides of the conveyor are spaced to permit the travel of the adjusting bolts between them.

By this arrangement, the U strap carrying the belt links



WITH this device, jars no longer topple.

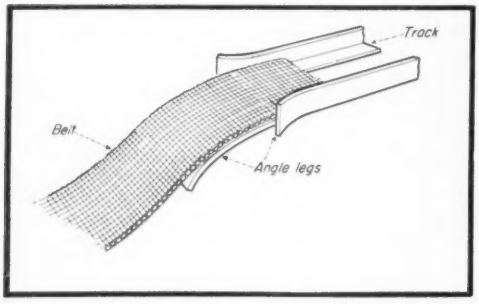
can be adjusted vertically and horizontally. The assembly (see photo) is placed over the feed conveyor at the point where the transfer is to be made.

Jar toppling is prevented by the weighted drag on the jar cap from the hinged belt links. This drag holds until the forward heel of the jar is over the second conveyor. Once clear of the hinged belt link and onto the second conveyor, the jar is prevented from falling by metal guide rods welded to the assembly.

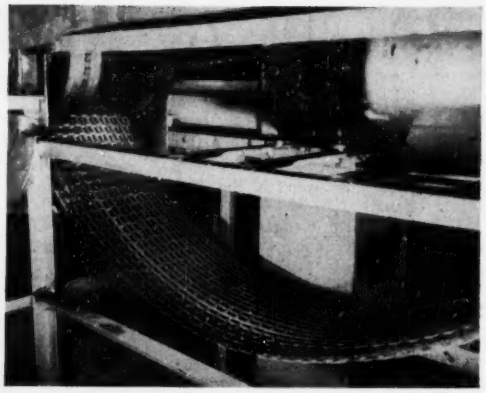
Belt Slack Proves Advantageous

Improved mechanical operation, the elimination of manual tightening, and a saving in space for the assembly were benefits gained when the company provided ample slack in the open-mesh metal conveyor belts.

Temperature changes and normal stretch alter the length



HOW belt is guided by lower track return.



SLACK gives space in between for drive units.

of these belts. Stretch lengthens them; temperature changes may lengthen or shorten them. Some provision is generally made to compensate, usually through a belt tightener adjustment on the free sprocket end of the conveyor.

However, the company found that providing ample slack below the drive sprocket readily took care of any changes in the belt length and eliminated the need of manual belt tightening. Weight of the metal belt in the slack portion gives sufficient tension to maintain a taut and level conveying surface with a minimum of binding.

The slack is terminated (see sketch) by the lower angle iron track return. The receiving end of the angle iron is flared to guide the belt, without obstruction, onto the track. The angle iron is cut by a torch where the legs of the angle meet. The horizontal leg is flared down, while the verticle leg is flared away from the belt.

This arrangement conserves time required for belt adjustments and provides space between the upper and lower belts, where it can be used to the greatest advantage. If sufficient slack is provided in the belt hanging below the drive sprocket, the motor, speed reducer, and chain drive can be mounted between the belts (see photo).

The conveyor drive gear can then be mounted at the center of the shaft—which is preferable to an outside drive mounted on the end. Motor, speed reducer, and drive are accessible without having to remove a complicated guard arrangement, as would be necessary with an outside drive. Further, this arrangement equalizes the pressure on the bearings, reduces the width of the conveyor assembly, and conserves space.—*W. A. Reed Plant Engineer; Taylor Reed Co., Glenbrook, Conn., and Ivan C. Miller, Editorial Consultant, "Food Industries".*

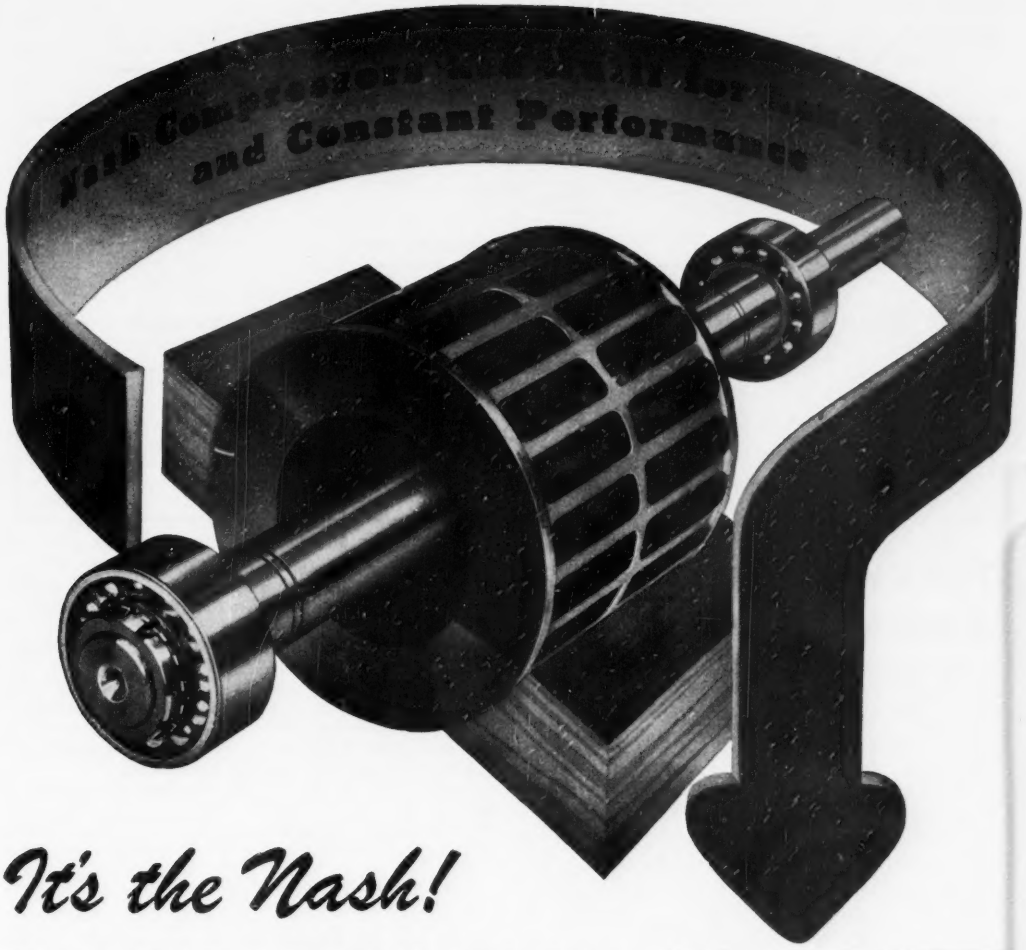
Foot Brake Aids Mixer Operation

By equipping a portable stand with a foot brake, Loft Candy Corp., Long Island City, N. Y., has simplified the task of mixing small batches of ingredients.

The company uses this unit in the preparation of fudges for the special tin pack. Being portable, stand and bowl can be readily moved from the ingredient station to the filler.

To hold the unit stationary while he hand paddles the ingredients the candy maker stands on a foot lever, causing it to function as a brake.

This lever consists of a piece of strap iron, approximately 2 in. wide by 6 in. long, that is bent into an "L" shape. It is fastened at the top of one caster, and when in the "down" position rests on the floor. For moving the stand, the lever can be turned up out of the way.—*F. I. Staff.*



It's the Nash!

The ability of Nash Compressors to maintain original performance over long periods is no accident. Nash Compressors have but a single moving element, the Nash Rotor. This rotor is precision balanced for long bearing life, and it revolves in the pump casing without metallic contact. Internal lubrication, frequent cause of gas contamination, is not employed in a Nash. Yet, these simple pumps maintain 75 lbs. pressure in a single stage, and afford capacities to 6 million cu. ft. per day in a single compact structure.

Nash Compressors have no valves, gears, pistons, sliding vanes or other enemies of long life. Compression is secured by an entirely different principle of operation, which offers important advantages often the answer to gas handling problems difficult with ordinary equipment.

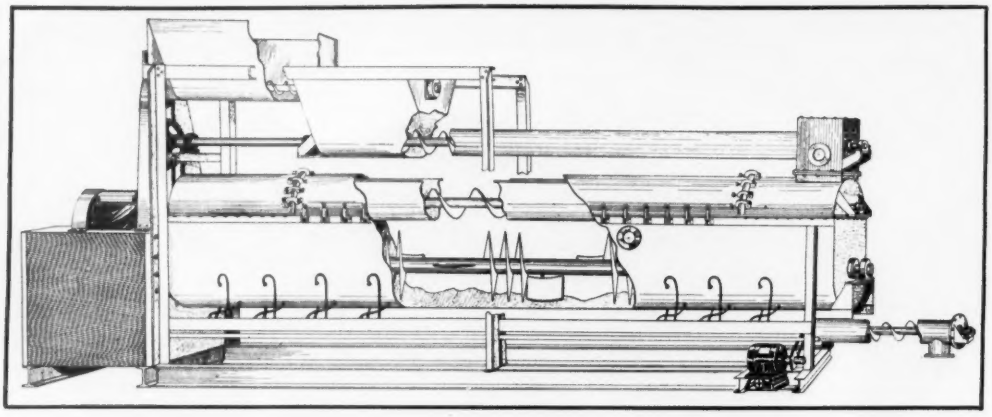
Nash Compressors are compact and save space. They run without vibration, and compression is without pulsation. Because there are no internal wearing parts, maintenance is low. Service is assured by a nation-wide network of Engineering Service offices. Write for bulletins now.

- No internal wearing parts.
- No valves, pistons, or vanes.
- No internal lubrication.
- Low maintenance cost.
- Saves floor space.
- Desired delivery temperature Automatically maintained.
- Slugs of liquid entering pump will do no harm.
- 75 pounds in a single stage.

NASH ENGINEERING COMPANY

31 WILSON, SO. NORWALK, CONN.

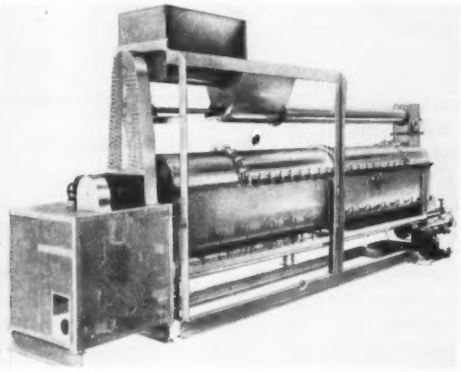
Food Equipment News



This Cooker Simplifies Applesauce Making A

A preheater tube, where apples and sugar are brought to temperature before entering the cooking chamber, a speed control system, and a temperature controller for better regulation of cooking time and temperature, are major features of an improved, continuous, fully automatic applesauce cooker.

In the preheater tube, a feed screw, coupled directly to the apple feed shaft, prevents overloading or jamming. Cooking time is controlled by varying the speed of the



main paddle shaft. Cooking temperature is governed by controllers with air-operated valves.

Between each of the close-pitched helical screw segments, on the main shaft, there is a series of paddles. As the apples and sugar move through the cooking zone, the paddles are constantly turning up thin sheets of the mixture, which are evenly presented to the automatically controlled steam.

For the average run of apples, pressure of steam inside the cooker is less than 1-lb.

Stainless steel is used throughout in construction of the cookers. Joints and seams are welded. All shafts are supported on ball bearings for trouble-free performance. Packing glands are machined to close limits for leak-proof fits.

Driving arrangement incorporates Reeves variable-speed pulleys, transmission and roller chains.

Cookers are designed for easy cleaning accessibility. The cooking chamber cover is fastened by quick-acting C-clamps, which will allow fast and easy removal. Feed screw of the preheater tube and the main shaft screw segments and paddle blades are easily exposed for cleaning.

Two models are manufactured to meet the needs of medium and large capacity processors, and design of both is identical. Capacity of the units are 8,000 and 16,000 lb. of applesause per hour.—*Allen Iron & Welding, Inc., 133 Murray St., Rochester 6, N. Y.*

C. P. Ion Exchange Resins Produced B

To meet the exacting requirements of laboratory workers in research and analytical studies, standard ion exchange resins are now being produced in a C.P. form. They are supplied in quantities less than 25 lb.

Through careful refining under rigorous control, these highly purified materials, designated Analytical Grade, are said to be free from traces of fines and soluble intermediates which might remain in the standard products.

In preliminary investigations of large-scale applications of the exchangers, the refined resins become convenient and time-saving tools. The manufacturer emphasizes, however, that it is not necessary or economical to employ the purified resins in commercial applicaions.

Development of these grades now gives the laboratory worker a complete selection of exchangers for the removal of positively or negatively charged ions from clear solutions over the entire pH range.

Resin grades available are: Amberlites IR-100 and IR-105, strongly acidic cation exchangers of the sulfonic acid type, effective in the pH range 4 to 8.5; the weakly acidic, carboxylic acid type cation exchanger, IRC-50, with a pH range of 6 to 14; the weakly basic anion exchanger, IR-4B, whose range extends from pH 1 to 7; and IRA-400, a strongly basic anion exchanger with pH range of 1 to 10.

Amberlite XE-81, a purified mixture of a strongly basic anion exchange resin and a strongly acidic cation exchange resin, is operable over a pH range of 0 to 14 and permits the deionization of solutions by the "mixed bed" method.—*Eimer & Amend, N. Y. C., and Fisher Scientific Co., Pittsburgh and St. Louis.*

Cleans Filters Without "Shut Down" A

More efficient and continuous operation of cloth dust-screen filters is now possible through the use of a new device recently announced.

Users of such filters have always faced the problem of gradual loss of efficiency of the units due to building up of dust on the cloth. To clean the filters means shutting down with a resultant loss of time and also wear and damage to the cloth by shaking or flexing.

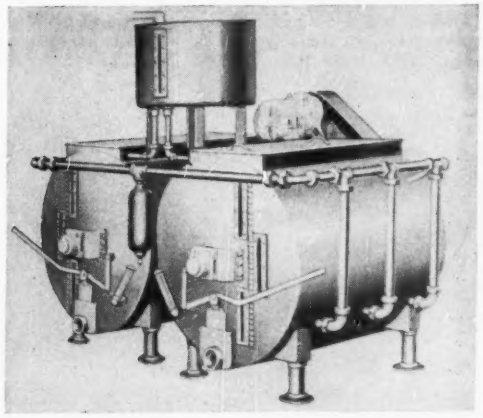
The new device solves these problems, with all shaking eliminated. This is how—

A suction housing, moving continuously from end to end within the collector, blocks off sections, or a determined number, of the filter bags during the course of its travel. Attached to the suction housing is a flexible tube which permits outside air to enter at atmospheric pressure. Since the chamber in which the cloth dust-collector bags are located is under suction from the exhaust fan, the outside air flows through the suction housing and the blocked-off bags in reverse.

This reverse air loosens and removes the dust, which drops into the hopper at the bottom of the collector.

Because not more than three or four of the 200 or more bags in the average dust-collecting system are blocked off at a time—and then only for a short period— a uniform suction at the dust source is maintained.

The new device, named the Dynaclone, can readily be applied to existing company installations. It is available now.—*The W. W. Sly Mfg. Co., 4800 Train Ave., Cleveland.*



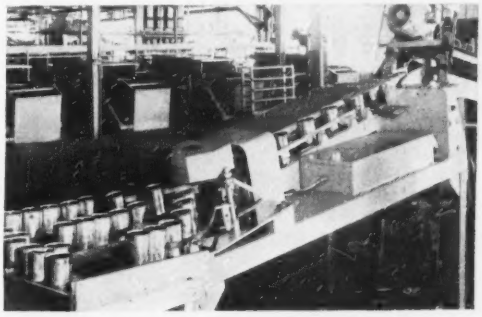
Sanitation Stressed in Batch Mixer B

Through re-designing and re-styling, in accord with recommendations of food technologists, this unit for heating and batch mixing cream-style corn has now been modernized into an all-sanitary machine.

Principle of operation of the standard mixer has been retained, but the structural features of the machine have been greatly improved. All product contacting parts are made of non-corrosive metals. Rounded corners and polished surfaces eliminate sharp corners and food collecting places. Ample space between the tanks is provided for thorough flushing when cleaning.

An extra large tank has been added to facilitate furnishing syrup to the mixing tanks. The tanks are easily cleaned inside and outside after a day's run.

The unit is 55 in. long, 6 ft., 9 in. wide and has an overall height of 52½ in. Capacity of a single corn tank is 150 gal., while syrup tank capacity is 46 gal. Power required is 1 hp. Paddles rotate at 25 rpm.—*Food Machinery & Chemical Corp., Sprague-Sells Div., Hoopeston, Ill.*



Electronics Separates Five Grades C

Cans of food are automatically separated by content or grade by a new machine, which reads magnetic markings electronically applied before the filled and seamed cans entered the cooker

This type of unit will handle up to five different grades, identifying cans whose tops and bottoms are magnetized with various combinations of positive and negative charges. Its capacity is 475 cans per minute.

Meanwhile a system is nearing the marketing stage which will mark and separate any number of grades of canned foods, using combinations of magnetic dots. Electronic markings are used in combination with visible codes for subsequent manual operations.—*Industrial Electronic Engineers, 5326 Sunset Blvd., Los Angeles 27.*

DON'T MISS THESE . . .

Tractor speeds order-selection, since driver has "walk-along" control ..... Page 92

New spray fan coolers are built for installations where head-room is low ..... Page 94

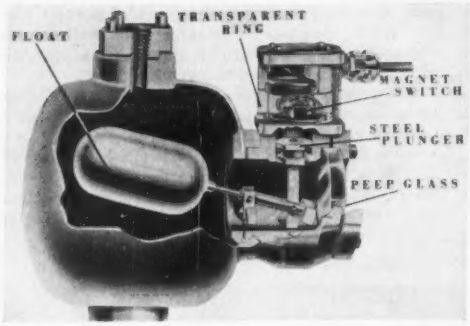
This centrifuge features external control of solids discharge and consistency ..... Page 95

Chain-type hoist, electrically operated, has three new performance features ..... Page 96

AND WATCH FOR . . .

Unique, V-shaped twin-shell apparatus for mixing or blending dry materials ..... In May FI

Total water hardness, correct to 1 ppm., can be determined in 1 min. by new method ..... In May FI



Float Switch Has Visual Features A

Intended for use on any evaporator of the flooded type is a new refrigerant float switch just announced.

Intended for refrigerants such as amonia and Freon, the new unit includes a peep glass to show the refrigerant level plus the float movement. Also, a transparent housing permits observation of the operation of the switch parts.

By incorporation of the magnetic principle, there is no direct connection between the refrigerant and the switch mechanism. A stainless steel float in the refrigerant operates a steel plunger that in turn actuates an externally mounted magnet switch.

The latter is encased in a transparent ring member so that observation of the mechanism is possible at all times. The float switch operates a solenoid valve to maintain the desired refrigerant level in the evaporator.

Switch mechanism can be serviced without pumping down the evaporator.—*Mojonnier Bros. Co., Chicago 44.*

Tractor Steps Up Order-Selection B

Despite its comparatively small size, this new towing tractor, which need not be ridden to be operated, will haul 10 tons on trailers over a level course at 1 to 6.5 mph.

The driver of the new unit can operate the machine while walking on either side of it—a feature that facilitates order-selection work, for which the tractor was designed. In short, the "pulling" or "picking" of items is removed from the off-again-on-again category. This work becomes a "smooth flow", at a saving of time and energy.

The unit has already undergone extensive use in one of the country's largest wholesale grocery warehouses. It is reported that it has enabled picking of 9,000 lb. per man hour. The new tractor method employs only one man.

A combination clutch-and-throttle control bar extending across the width of the tractor above the cowl, makes for ease of control and driving while the driver is walking. By simply moving the bar forward, the driver can move the tractor and train a few feet at a time, or from item to item in the order-selection line. Weight of the train acts as a brake, thus giving the driver maximum time to pick and place items on the trailers.

If positive braking is necessary while the driver is walking, he simply touches a foot to the brake bar at the rear of the driving platform. The parking brake, actuated by electricity, is controlled by a toggle switch on the instrument panel.

In normal driving position, the operator stands on a platform only a few inches higher than the floor. Hence mounting and dismounting is easy. Also, a back rest provides safety and comfort for the driver while mounted. Large steering wheel is centered over the cowling so that it can be handled easily from any operating position.—*Clark Equipment Co., Industrial Truck Div., Battle Creek, Mich.*

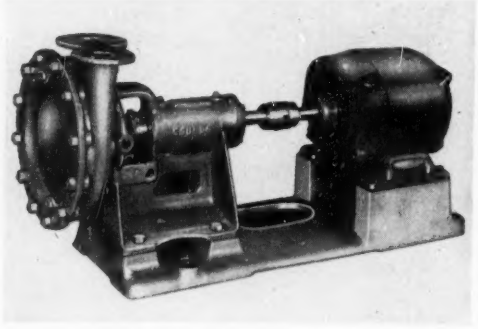
Portable Load Booster Speeds Job C

To step up efficiency in loading and unloading trucks and freight cars, or moving materials from one level to another, a new low-cost, portable, load-lifting belt conveyor has been announced.

Known as the "Styl-O-Veyor Junior," it lifts at a 32 deg. angle and can be worked in reverse.

Load rides on a "Ruff Top" 3-ply rubber belt. Unit is powered by an over-sized aluminum geared head motor with "sealed for life" bearings. Load bed is made of heavy 10-gage one-piece formed steel with large pulley ends for rapid adjustment.

Sturdy steel support frame with wide bottom cross members prevents side sway, an operating safety feature. Support frame struts, cross members and extension arm are all welded into a single unit. The wheels and the three heavy casters on base end are all ball bearing, mounted for easy maneuverability, even when loaded.—*Island Equipment Corp., 27-01 Bridge Plaza N., Long Island City 1, N. Y.*



Corrosive-Liquid Pumps D

Engineered to give dependable, efficient service, newly announced stainless-steel centrifugal pumps are designed to handle corrosive liquids. In this new line, pumps are available in eight sizes with capacities up to 750 gpm. and heads up to 180 ft., depending upon capacity.—*Gould Pumps, Seneca Falls, N. Y.*

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Ham boiler liners
Deep freeze wraps • Can liners
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Margarine wrappers
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Patapar Vegetable Parchment is famous for its wet-strength. Soak it, drench it—even boil it. Patapar comes out strong and glistening.

But wet-strength is just one of Patapar's qualities. This unique paper is produced in 179 different types. Each type has special qualities to meet special problems.

Do you want a paper that resists grease? A paper that is odorless? Tasteless? One that is air tight? Patapar can help you. The 179 types fill varying requirements of wet-strength, grease-proofness, opaqueness, moisture vapor resistance, pureness and many, many other qualities.

Some of its uses

Patapar is wonderful as a wrapper for protecting foods like butter, bacon, fish, cheese, margarine, poultry. It is used for making lampshades, beautiful greeting cards, for rubber mold liners, putty wrappers, artists' sketching pads.

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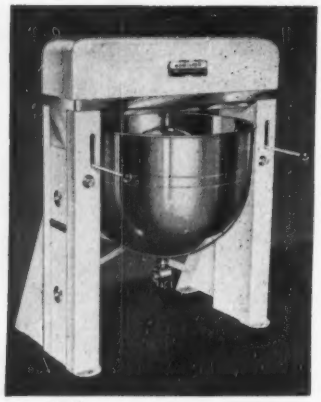

Is this the kettle you've wanted for years?

Splash-proof, dirt-proof. Smooth sanitary surfaces, easy to clean. Self-contained hydraulic lifts to raise agitator and cover. Self-lubricating "Oilite" bearings. Heavy duty double-motion agitator in a properly proportioned, beautifully finished stainless steel jacketed kettle bowl. Non-corrosive sanitary drawoff valve.

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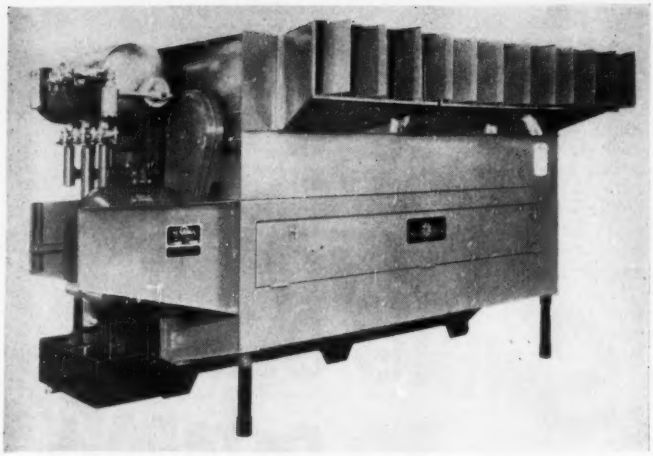


New Spray Fan Coolers Are Only 6 Ft. High A

For convenient installation in refrigerated rooms where high capacity is required but ceiling height is restricted, a special series of spray fan coolers has been announced.

In the new "Low Head Room" design, the fan section is located on the side of the unit instead of on top. Air enters the spray section at the top and is chilled in passing down through the spray and over the refrigerant coils. It enters the fan section at the bottom and is discharged from the side at the top.

When refrigerant temperatures below freezing are used, the process is kept free from frost, ice, or from freezing by the use of brine or "No Frost" Liquid in the sprays.

Five unit sizes are now produced, with capacities ranging from 1,680 to 11,000 cfm. of chilled air. Maximum height is 72 in. Floor space required ranges from 16 to 72 sq. ft. Because of improved efficiency in air travel, experience shows that this new type cooler delivers more air at lower power consumption than do conventional vertically arranged coolers. — *Niagara Blower Co., 405 Lexington Ave., New York 17.*

Flexibility Marks Small Exchanger B

Designed for use in batch pasteurizing plants and for single duty applications in the larger dairies is the new, small, all-stainless steel Model HT plate heat exchanger.

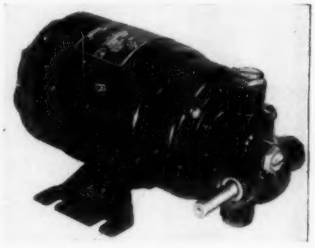
Most of the features of the larger models are included.

The new model has been engineered with definitely known operational efficiencies, and is particularly suitable for the rapid heating, regeneration and cooling operations involved in processing milk and milk products, and for high temperature-short time pasteurization, heating to 160 deg. F. and holding 16 sec.

Frame and plates are polished solid stainless steel, die pressed and shaped for extreme strength. All surfaces are permanent, readily accessible and easily cleanable. There is no paint to chip, or plating to wear away.

Frame is free draining, and connections with plates are of convenient height to allow complete inspection and thorough cleaning. Plates have smooth polished corrugations and streamlined passages to eliminate dead ends and flow obstruction. Totally enclosed circuits are designed to prevent contamination, and leaker grooves insure against a mixture of brine and water.

Patented paraflow design of plates



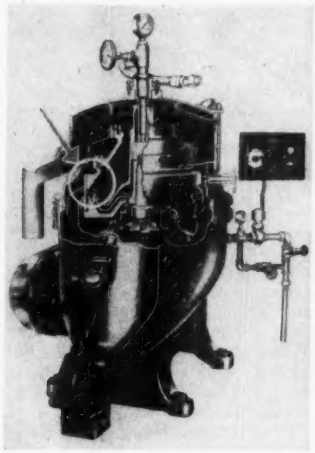
Gear-Head Motor C

A complete range of countershaft speeds for the powering of all types of electrically-activated devices is offered in a new line of fractional-hp. gear-head motors. New units are compact, neat in appearance, and easy to install.—*Robins & Meyers, Inc., Springfield, Ohio.*

provides increased heat transfer. And according to the maker, milk-to-milk regeneration can be achieved with savings of about 75 percent in both cooling and heating.

Single point opening and closing is reported rapidly and easily effected through a screw and ratchet wrench, assuring an even pressure on the entire follower head and plates. Rubber compression unit in the end support flexes to relieve abnormal pressures caused by possible freezeups, and thereby protects the frame and plates against damage. Correct working pressure is clearly shown by an indicator.

New exchanger has considerable flexibility. A simplified changing of number or arrangement of plates permit capacity increases to the extent of available space within limits of frame. Conversion to other applications is reported accomplished. — *The York Corp., York, Pa.*



This Centrifuge Features New Control of Solids

Recently announced is a new centrifuge featuring external control of solids discharge and solids consistency.

Known as the Model DV-2, it employs the stratification principle of high separating efficiency combined with high capacity. It develops a centrifugal force equal to 6,200 times the force of gravity. Unique in the new unit are ten externally controlled solids discharge valves located radially inside of the bowl (see arrow). They are operated by the admission of water (or other operating liquor) through a separate channel of the centrifuge.

Since both the frequency and duration of valve opening are precisely adjustable, the centrifuge provides: (1)

Quick way to make LARGE SAVINGS

The type of carton you are now using, or your method of cartoning, may be costing you far more than is necessary.

If you are using factory-processed cartons, a Palmer *continuous motion* carton forming machine will enable you to make an immediate saving in material costs. For the Palmer sets up a strong, attractive looking carton from inexpensive die-cut blanks. This type of carton, now being used by leading manufacturers, has successfully replaced many types of more expensive cartons. *And the savings made frequently pay for the machine in less than a year!*

If you are setting up cartons by hand, or on a conventional carton forming machine, the Palmer *continuous motion* machine will likewise show important savings. It has far greater speed—up to 102 cartons per minute. Can be more quickly adjusted for a different size. And its continuous motion method of operation results in better formed, more securely sealed cartons—thus preventing damage in the over-wrapping process and waste of material.

Moreover, the Palmer gives you a finer looking carton because its exclusive method of forming and sealing locates printed panels accurately and prevents bulging sides.

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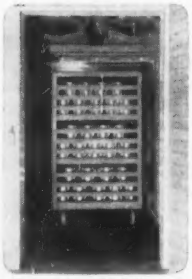

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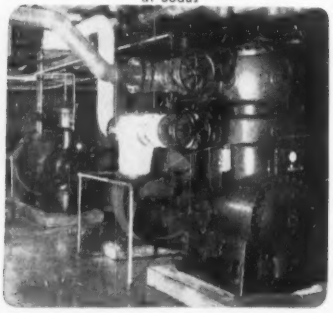
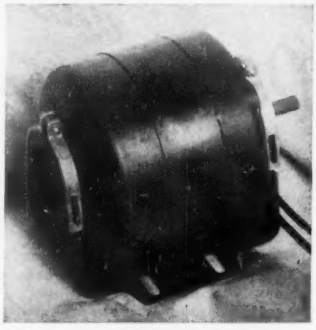


Control over the consistency of solids; (2) minimized loss of mother liquor with solids, and (3) greater scope of centrifugal application in that flocculent suspensions, slimes and other troublesome solids can be efficiently handled.

Machine is available as either a separator or clarifier. While solids discharge is generally controlled by external timers, it may also be operated by process control instrumentation.—*The Sharples Corp.*, 2323 *Westmoreland St., Philadelphia* 40.



Motor Can Be Operated In Any Position A

For use as drives on fans, evaporative coolers, unit heaters, space heaters, small pumps and agitators a new line of lifetime oil-lubricated, shaded-pole motors has been announced.

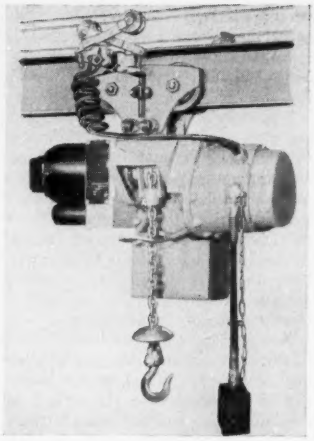
These motors have been designed for operation in any position—shaft up, down, horizontal, or at any intermediate angle.

Available in either open or totally enclosed construction, these motors range from 1/40 through 1/12 hp., at 115 or 230 v., 1,050 or 1,550 rpm.

A new lubrication system provides a constant flow of oil from a large reservoir to the bearing surfaces, regardless of the position of the motor. Oil-saturated packing continuously feeds the bearing with filtered oil; no additional lubricant is ever required.

Other features include: A new unit-bearing construction in the shaft end of the motor for greater strength on direct-connected loads, treated stator windings of Formex (R) insulated wire, and vibration-absorbing, resilient end rings, which are resistant to oil and aging.

Mounting arrangements include resilient end ring, cradle base, and band mounting. Motors also are available with four tapped holes on the shaft end for mounting.—*General Electric Co., Schenectady* 5, *N. Y.*



Chain-Type Hoist Is Fast-Acting B

Lifting speeds up to 41 fpm., a lower as well as an upper limit stop, and a wide "pick-up" angle, are three of the new performance features of a new chain-type electric hoist recently announced.

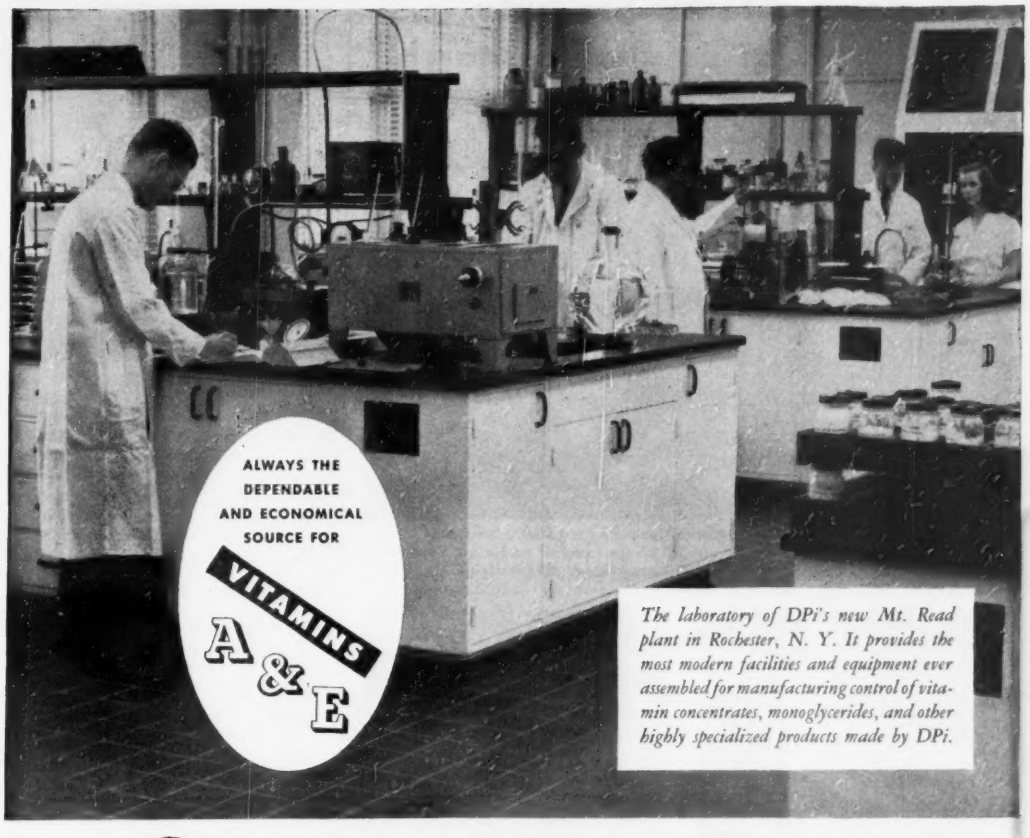
Hoist is available in load capacities of 500, 1,000, and 1,500 lb. Standard models lift loads through any height up to 40 ft. Principal distinction of the hoist is that a link chain, over an electrically driven sheave, supports the load.

This permits extra long lifting lengths, since wound-up chain does not wrap around a drum but collects in a metal container as the hook raises. The single-strand load chain securely engages six pockets of the sheave to move and hold heavy loads with a minimum of chain friction.

Hoist hook can "reach out" as far as 30 deg. from the vertical to pick up loads. Wide pick-up angle and the flexibility of the load chain—free of twists and kinks—enables an appreciable reduction of time and power consumed in "inching" the hook up or down for close "spotting."

Limit stops prevent over-travel of the hook when lifting or lowering. They operate when the hook reaches predetermined levels, breaking the electrical circuit to return the push-button controller from either the "up" or "down" position to "neutral."

Hand controller is suspended by a light-gage chain so that neither electric cable nor electrical connections take the weight of the controller. Control box is situated at a level convenient to the operator, and the flexible control cable carries only switch-energizing current.—*The Yale & Towne Mfg. Co., Philadelphia Div.*



The laboratory of DPi's new Mt. Read plant in Rochester, N. Y. It provides the most modern facilities and equipment ever assembled for manufacturing control of vitamin concentrates, monoglycerides, and other highly specialized products made by DPi.

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● "Everything's under control" has come to be a pat phrase to assure one that "everything's o.k.—there's no need to worry."

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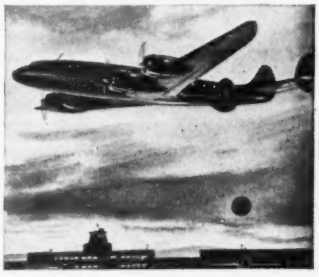

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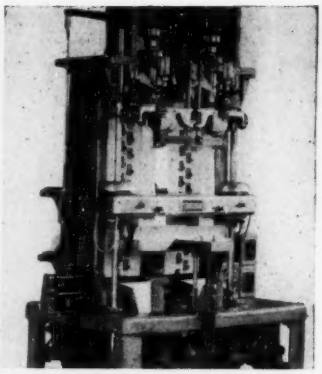

Now Handles Polyethylene A

This packaging machine which applies heat-sealing films such as cellophane, pliofilm, and foil can now be equipped to handle polyethylene. Production speeds range from 40 to 100 packages per min., depending upon size.—*Stokes & Smith Co., 4900 Summerdale Ave., Philadelphia 24.*

Equipment Briefs

Gas-Fired Incinerator B

Health hazards commonly associated with unsightly stored refuse and garbage are eliminated by use of a new gas-fired incinerator. Unit is shipped knocked down, ready for erection on site. Constructed of heavy-gage bonderized steel throughout, it has a 20-bu. capacity combustion chamber lined with fireproof Haydite slabs. Over-all dimensions: Height, 84 in., with 41-in. square sides.—*Ramsey-Bennett Co., 430 Huron Rd., Cleveland 15.*

Bulk Handling Accessory C

Designed for use with fork trucks is a new interchangeable hydraulically-operated device known as the "Scoop-Shovel". Purpose of this accessory is to eliminate manual labor of scooping, lifting, moving and dumping of grains and similar loose materials. Unit handles up to 27 cu. ft. of materials and can dump into bins at heights up to 130 in.—*Yale & Towne Mfg., Co., Philadelphia Div., Philadelphia, Pa.*

Ultra-Violet Light D

A small, portable, long-wave ultra-violet light called Mineralight, incites fluoresence in milkstone, fats, and other extraneous solids not readily apparent to the eye. It is used like a flashlight, and when beamed against equipment surfaces or into cans, the deposits fluoresce, are instantly detectable.—*Klenzade Products, Inc., Beloit, Wis.*

Air Purger E

Small air purger for 50-ton refrigeration plants is designed to reduce excess head pressure, purge noncondensable gases, and automatically return excess gases to system. Operation is continuous.—*Rex Engineering & Sales Co., Box 5141, Oklahoma City.*

Coding Machine F

A new unit for imprinting supplementary information and code-dates on all types of packages is now offered. In addition, a 15 min. film illustrating its use may be obtained for showings at no charge.—*Adolph Gottscho, Inc., 1 Hudson St., New York 13.* —*End*

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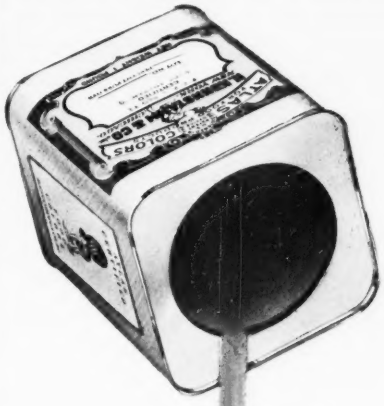

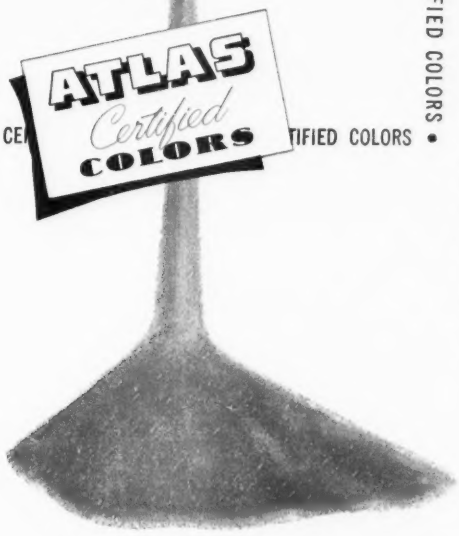

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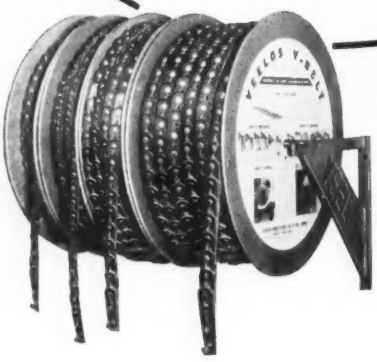

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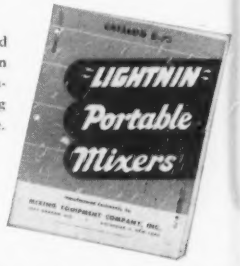

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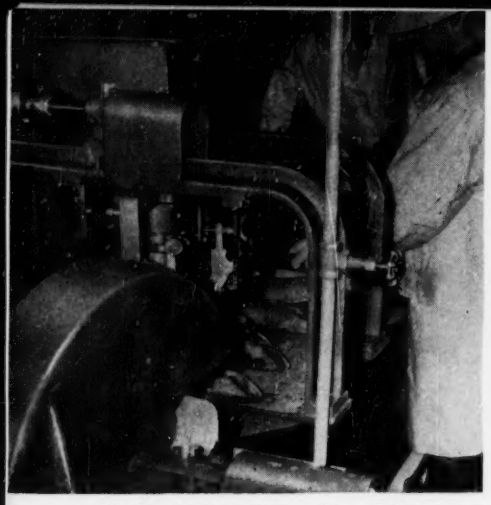
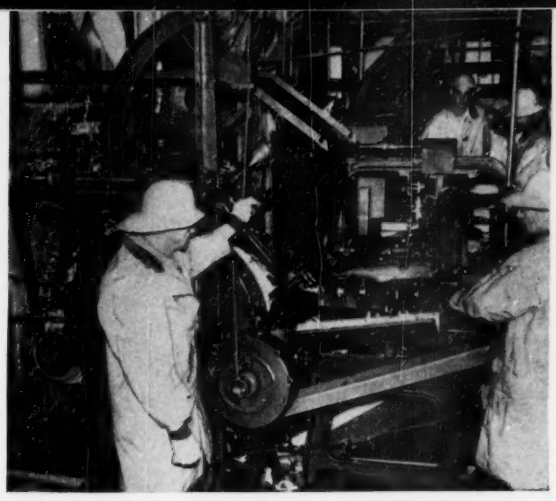


1 INDEXING MACHINE positions fish for butchering unit. Worker (foreground) feeds in fish. Second man places them on conveyor.



2 IRON CHINK, or mechanical butchering unit, automatically removes head, tail, fins and viscera at a rate of 75 fish a min. Machine eliminates manual butchering labor.

Mechanized Salmon-Canning Operation

Line's automatic units butcher, bone, skin, fill, and weigh fish into cans

(Article on Page 44)

ADVANCED METHODS and processing equipment mark the operations of Pacific American Fisheries, Inc., front-rank salmon canning firm.

Among the outstanding mechanical and engineering improvements on the line at the company's Bellingham, Wash., plant are: The Foonken Indexing device, the Iron Chink (butchering machine), the boning machine, the fish skinner, the fish cutter and filler, and the weighing machine.

Salmon are flumed from storage bins to the hopper at the start of the canning process. First step is feeding the fish to the indexing unit, which positions the salmon so that the Iron Chink's guillotine can sever the heads and remove tails, fins and viscera—as illustrated at Points 1 and 2 in our foldout flowsheet (right).

Next comes the inspection (Point 3). Here, workers remove any remaining viscera that may have escaped the butchering machine. They also wash the body cavities.

Leaving the inspection table, the fish are now carried to the boning machine (Point 4), where the backbones are cored out. And then two circular knives cut the salmon into a pair of loins. Bones are flumed to a refuse bin.

Loins are now conveyed to the skinning unit (Point 5). A main cylinder, equipped with pneumatically operated clamps for holding the product, carries the loins past a band-knife directly below the cylinder. Set for just the right depth of cut, the knife removes the skin, which today is conserved for manufacturing into leather.

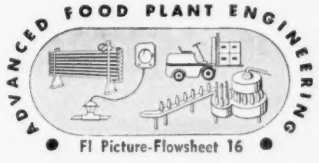
Now comes the cutting of the fish and filling them into cans. Loins are chopped into 1¾-in. pieces by a series of circular knives. Pieces are fed into buckets on a chain conveyor that travels into a tunnel serving the filler unit (Point 6). To obtain a proper fill, this tunnel turns the pieces of fish from a horizontal to vertical position. A tumbler and tumbler-fork push the pieces into a compartmented rotary measuring unit. When each compartment is filled, it closes and compresses the fish. Meanwhile, cans are being fed to the rotary filling unit below the compartments. A plunger now forces the fish into the cans.

Automatic weighing follows. Cans enter the weighing machine (Point 7), which contains individual scales. "Light" cans go to the patching line, where they are filled to the correct weight.

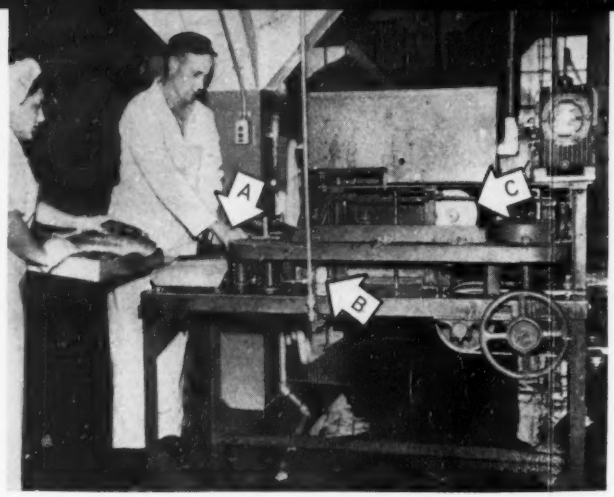
Next, the cans are sealed (Points 8 and 9). A curler clincher rolls the lids over the top of the cans. Leaving the clincher, the cans are spray-washed prior to entering the vacuum sealing machine, where they are closed under 25 in. of vacuum.

Final step is loading of the sealed cans into retorts (Point 11) and sterilizing them at 242 deg. F. for 1½ hr. They are then spray-cooled, labeled and cased.

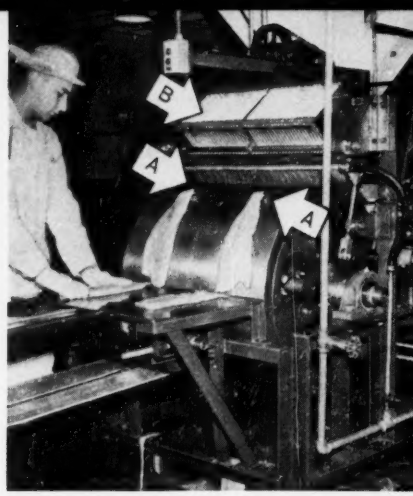
FOOD INDUSTRIES Apr. 1950 Pages 100-103



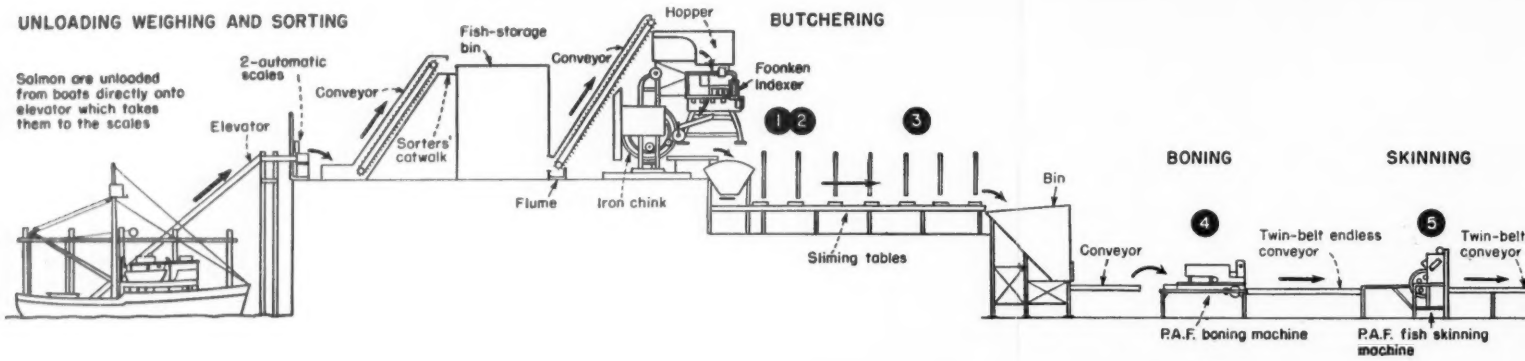
3 **BUTCHERED FISH** go down sliming table, where girls remove remaining viscera, wash body cavities.



4 **THIS UNIT** takes out backbone. Fish put on indexing rail (A) are split by saw (B). Another saw (C) severs loins from backbone.

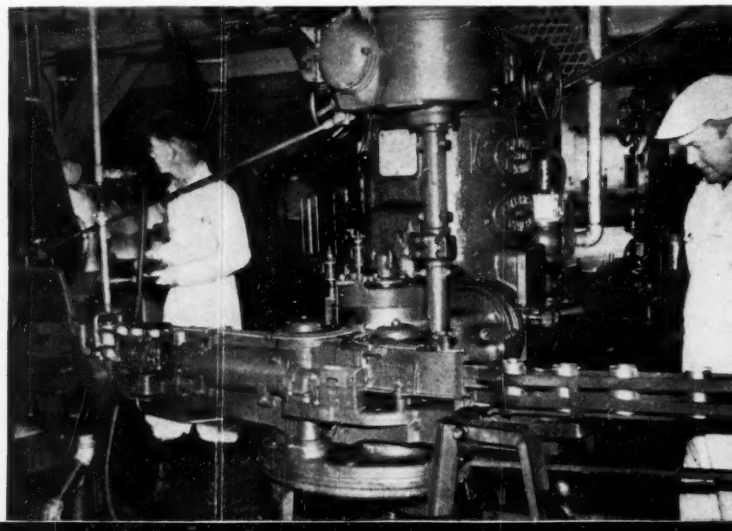


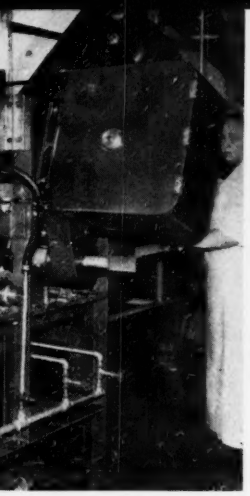
5 **LOINS** are now machine-skinned. Clamps (A knife. Spring-tightened fingers (B) hold loin



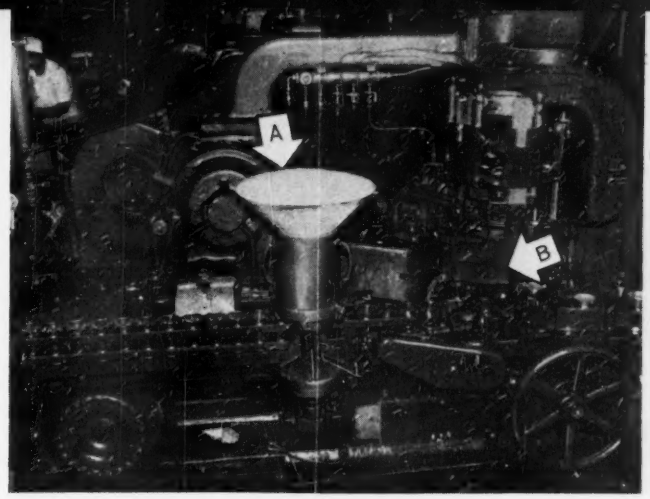
8 **LIDS** are rolled over cans by this clinching machine. These tops are put on loosely to allow any excess air to escape in high-speed vacuum closing unit.

9 **VACUUM CLOSING** is next step. A rotating valve times entry of cans into chamber, they are hermetically sealed under 25 in. of vacuum.

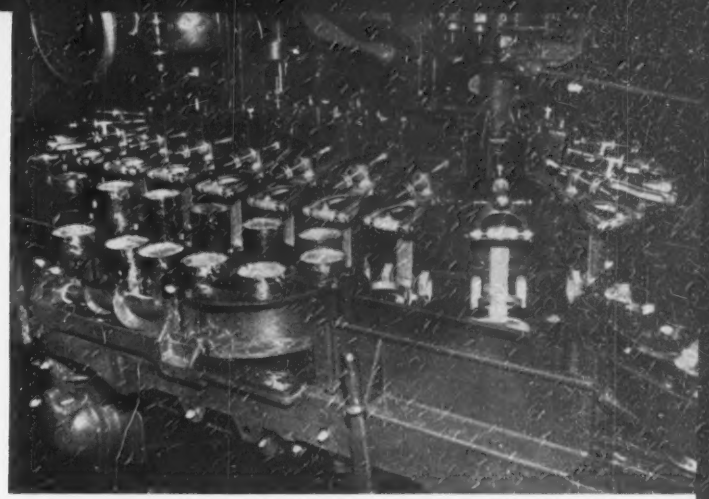




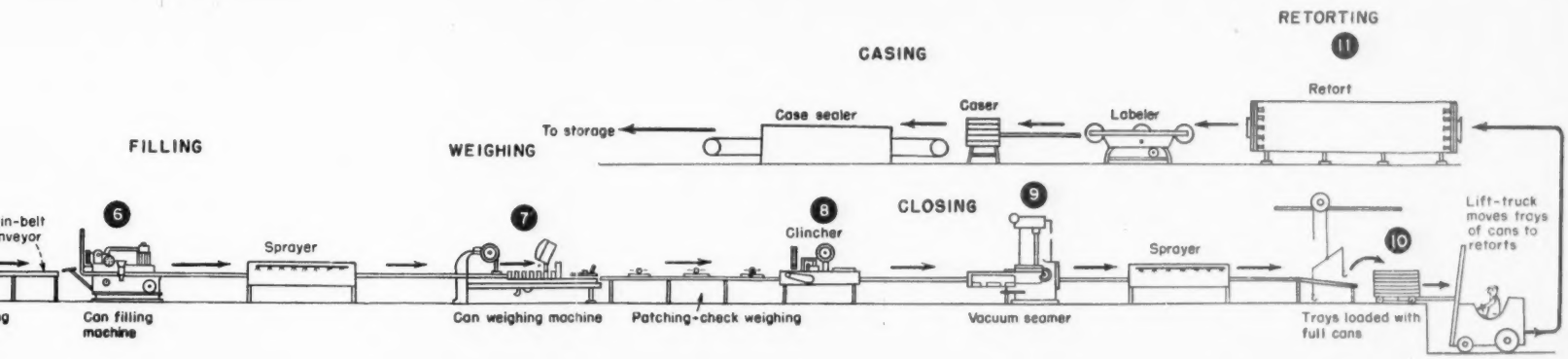
ps (A) pull loins to skinning
d loins flat against cylinder.



6 **EMPTY CANS** travel under automatic salt dispenser (A). They continue to rotary unit (B) where they are filled with a measured amount of fish.

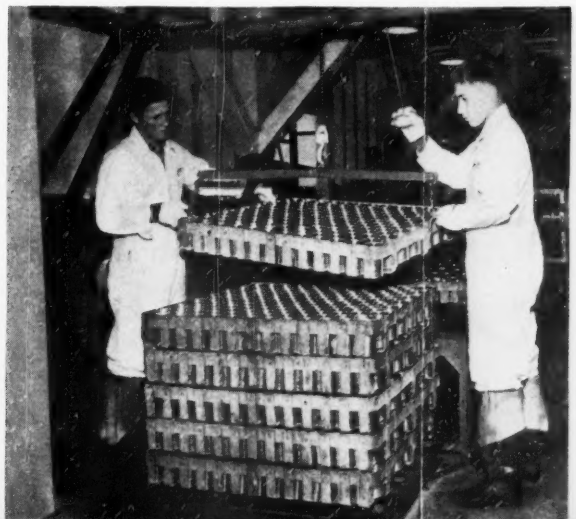


7 **HERE,** filled cans arrive at automatic weighing machine. Underweight cans are diverted to patching line where they are filled to correct weight.

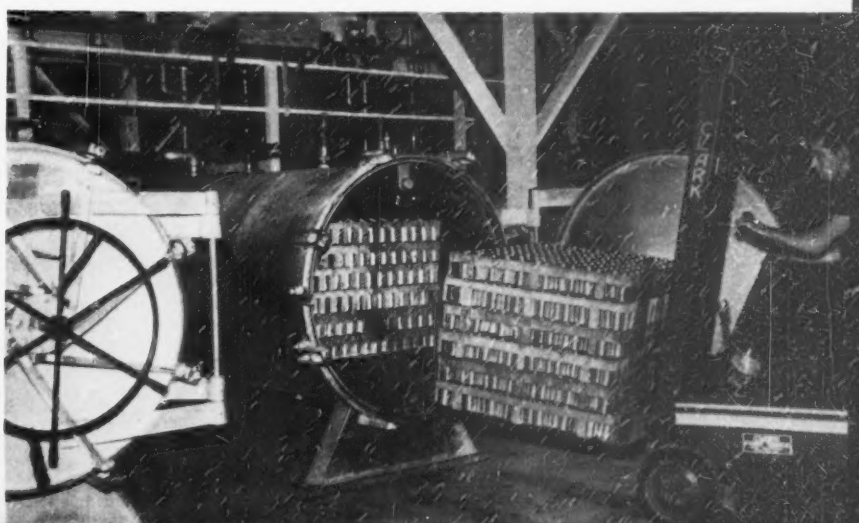


mber, where

10 **AFTER** cans have been spray-cooled, they are loaded on retort trays, which are then stacked six high.



11 **FINALLY,** a fork-lift truck loads a tray-load of cans into retort. Canned salmon is then cooked at 242 deg. F. for 1½ hr. Cans are now cooled, labeled, cased, and sent to storage.



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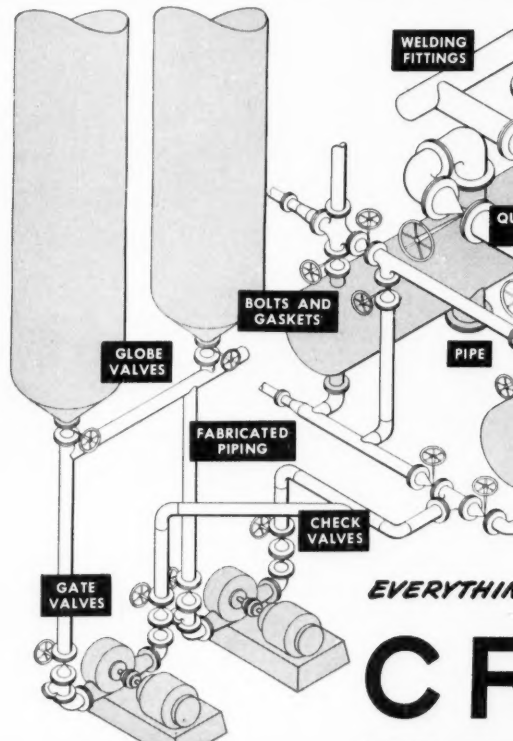

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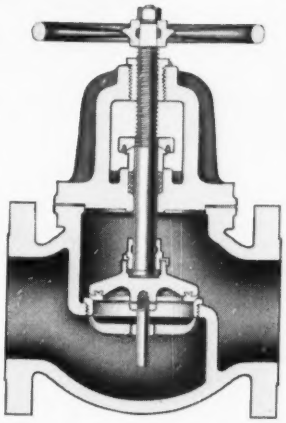

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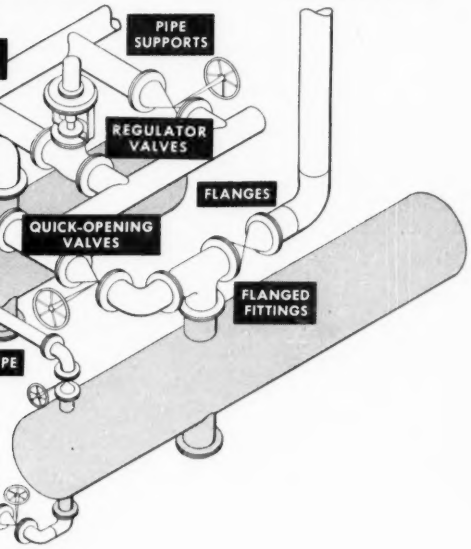

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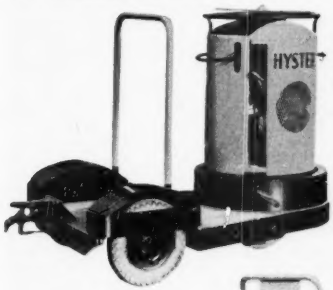

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New Packages and Products

Ready-to-Eat Turkey A

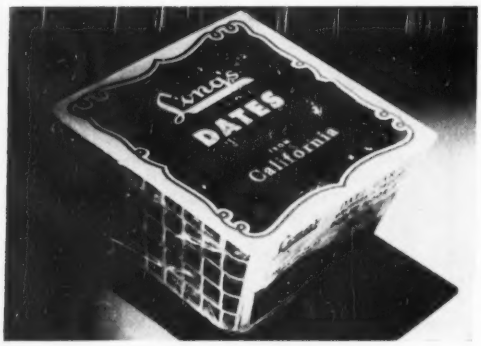
Boned roasted turkey can now be bought in a new, ready-to-slice-and-eat loaf. It is packed in its own natural juices.

Tradenamed Tur-King, each loaf is easily sliced by machine or hand, making it suitable for both commercial and home use.

In addition to developing the new product, the Bestwest Produce Co., Milwaukee, sought a means of packaging that would preserve the natural flavors. Adopted was Mil-O-Seal casing, designed by Milprint Inc., Milwaukee, to prevent loss of weight, and mold or slime growth.

The turkey loaf is heat sealed on one end and tied at the other to facilitate packaging.

This product is presently sold only in the midwest, but plans are being made for national distribution. Meanwhile, addition of a smaller size loaf is visualized for the future to broaden the market.



Plastic Basket for Dates B

Solving its need for an attractive retail package for dates, Long's Date Gardens, Pasadena, Calif., has adopted a wide mesh, open faced plastic basket, neatly overwrapped with cellulose acetate film. The plastic is rigid molded.

The transparent Colodense film, made by Shellmar Products Corp., Mt. Vernon, Ohio, affords a clear view of the dates, and the basket's wide mesh pattern permits the fruit to be seen by the consumer from the sides also (see photograph).

For protection during shipment, a cardboard sleeve is placed over the package. This can be readily slipped off for display.

Long's reports that many favorable comments on the new package have been received from their distributors.

Frozen Prune Juice C

Successfully test-marketed, frozen concentrated prune juice is now being produced in 6-oz. cans at the rate of 6,000 cases a day by the Fruiterest Corp., Brooklyn.

The concentrate will make 1½ pt. of unsweetened prune juice, free from preservatives, acids and caramelized flavor.

Developed in collaboration with Universities Research, the juice is concentrated in a Mojonnier evaporator, under vacuum at a temperature of 62 F. To assure better flavor, there is an auxiliary operation in which the prunes, after leaching but before pressing, are pitted and then ground in a hammer mill. Removed by solvent extraction, the flavor essence is added to the concentrate.

Loaf With Five Fruits D

Bread baked with five fruits is now available to bakers on an exclusive franchise basis. Nearly ¼ lb. of fruit, selected from dates, oranges, lemons, apricots, peaches, prunes, and raisins, is in every loaf.

The baker, California Fruit Bread, Inc., of Los Angeles, states that addition of such a varied blend of fruits called for a new baking procedure. Since fruits all have different moisture contents, it was necessary to perfect a process whereby a balance would be obtained without impairing the flavor of the fruits. Two years was given to this research.

The fruit is added in dried nugget form without soaking, thus making for ease of handling. The fruit nuggets in the finished loaf are said to have a natural, moist flavor, barely distinguishable from fresh fruit itself.

The attractive cellophane wrapper is Lustro-printed in five colors.

The mark of a good glass container

For information see your Armstrong representative or write to Armstrong Cork Company, Glass and Closure Div., 4204 Prince St., Lancaster, Pa.

ARMSTRONG'S GLASS

OIC
PACE SETTER
IN VALVES

Engineered FOR LASTING SERVICE

200 LB. UNION BONNET BRONZE GATE VALVE

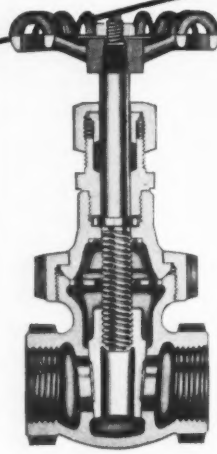
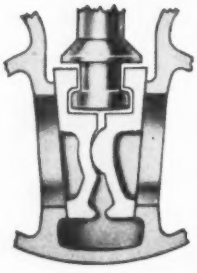


FIGURE NO. 7208
Non-rising stem, integral seat, OIC nickel alloy solid wedge, screwed end type.

FIGURE NO. 7200
Rising stem, integral seat, OIC nickel alloy solid wedge, screwed end type.



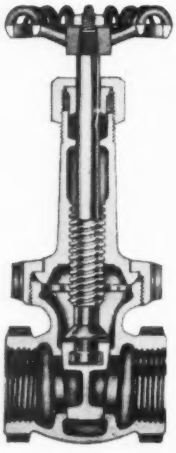


FIGURE NO. 7202
OIC Nickel Alloy double taper wedge automatically adjusts itself to its seat as valve is closed.

DESIGN: Solid wedge, rising stem; double-tapered wedge, rising stem; or solid wedge, non-rising stem. Integral seat, screwed end design.

BODIES: Of Steam Bronze ASTM B61, with average tensile strength of 40,000 lbs.

BONNETS: Also of Steam Bronze, with seal on lower end which mates with corresponding surface on stem to allow valve to be packed while fully open and under pressure. Condensing chamber below the stuffing box to keep packing cooler on high-temperature lines.

GATES: Of two types.

SOLID WEDGES are OIC copper nickel alloy, are of I-beam design, and reversible.

DOUBLE-TAPERED WEDGES fit into same bodies, but have ball and socket design, allowing wedge automatically to adjust itself to seat as valve closes. Accurately machined guides on both types, and tapered seating surfaces to give full contact with body seats as the wedges wear.

STEMS: Of manganese bronze, with double Acme thread for quick traverse of the wedge. Diameters sufficient to bear torsional loads greater than strongest hand pressure and to withstand severe operating conditions.

SEATING SURFACES: Machined to five-degree, self locking angle.

HANDWHEELS: Of ventilated malleable iron, finished in black enamel.

RATINGS: For steam at 200 lbs., 550 degrees F.; for cold water, oil, or non-shock gas service at 400 lbs. Shell tested at 500 lbs. and seat tested at 400 lbs.

SIZES: One-fourth inch to three inches currently available.

Special **INTRODUCTORY OFFER**

Check this 200-lb. Union Bonnet Bronze valve. Send us the size, and we'll deliver you a sample on memo billing. Keep it 30 days, take it apart, analyze it, test it. After you've examined all its superiorities, you may return it, if you wish, for full credit.

OIC VALVES

THE OHIO INJECTOR CO.
270 MAIN ST. WADSWORTH, OHIO

BRONZE • CAST STEEL • FORGED STEEL • IRON

D-1150-21

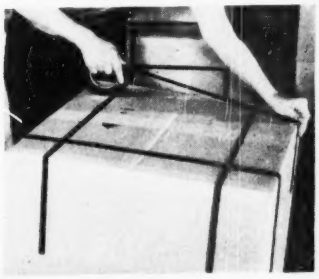
2-In-1 Color Effect A

The Grand Union Co. has further lowered its already-low package costs with a redesign of its multi-color labels to just one color—at the same time getting the effect of two colors by employing the label-stock color as a "free hue".

A master design is used for all the company's products. By ganging on one sheet three or four different labels that are of the same color and putting them through the same press run, reproduction costs are reduced.

Another innovation is a shopping check list printed on the backs of the larger boxes in the line. This induces the housewife to note her needs in advance.

Martin Ullman, industrial designer, created the new labels.



Reinforced Tape B

Incorporating special filaments for reinforcement, two new adhesive tapes for heavy duty packaging are offered by the Minnesota Mining & Manufacturing Co.

Thousands of the filaments—rayon in the one tape, glass in the other—are embedded lengthwise in the resilient rubber acetate backing.

Tested during 1949, the tapes proved especially suitable for banding and stripping fiberboard cartons. Because they leave no sharp edges, the tapes reduce handling injuries. And damage to adjoining packages is thus minimized.

The rayon tape has a tensile strength of 175 lb. per inch of width, while the stronger glass product is rated at 500 lb. per inch.

Standard widths are ½-, ¾- and 1-in. Rolls are available in transparent form, and in colors—red, blue, black, and white.

Chinese Dinner For Two C

New combination package is a Chinese dinner for two, bearing the Chin and Lee brandname. Included is a noodle soup mix in transparent cellulose envelope, a 13-oz. can of vegetable chop suey, a can of vacuum packed Chinese noodles, two tea bags, and a small bottle of Soy Sauce. Taylor Reed Co., Glenbrook Conn., is the national distributor.

High-Vacuum Coffee D

A new crystal coffee product, prepared by a high vacuum technic, is reported to be exceptionally soluble. The technology employed is termed similar to that used in making the popular concentrated frozen orange juice.

Developed in a pilot plant of the National Research Corp., Cambridge,

A Cambridge Balanced Belt whisks frankfurters and bacon through the packaging operation. Open mesh and stainless steel construction permits caustic or steam cleaning and meets all sanitary requirements.

with *Cambridge*
WIRE BELTS

Cambridge Wire Belts are efficient workers in your field. They serve in heat, cold, corrosive and wet processes; through packaging and assembly operations—moving quickly or slowly at constant or varying speeds. Wherever a material can be processed during movement, a Cambridge belt can, and does, save time, money and floor space.

Cambridge offers you a modern engineering staff with experience in your field and skilled workmen to produce the right belt in the correct mesh and weave, metal or alloy to perform your operation better . . . for longer.

Consult your Cambridge representative—look under "Belting, Mechanical" in your Classified Telephone Directory or write direct.

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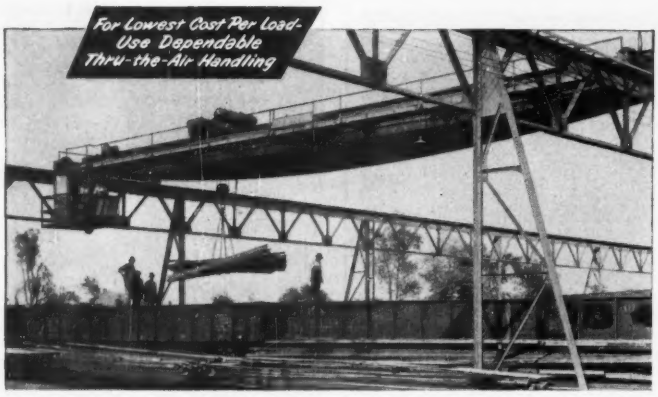
Wire cloth in rolls. Also specialized wire fabrications.

OFFICES IN PRINCIPAL INDUSTRIAL CITIES



This installation required built-up plate, welded box construction . . . fish-belly design . . . enclosed cab . . . complete weatherproofing . . . main and auxiliary hoist units (see illustration below).

How to get the most CRANE for your money

When you buy a crane, make sure you select the machine best qualified to do *your* job! The work for a crane in your plant probably differs from that in your neighbor's plant. The general crane rating and other details which are perfect for his handling problems may not be at all suitable for yours. To get the most crane for your money, let *crane duty* determine *your* choice.

It isn't entirely a matter of capacity. Travel speeds, hoisting speeds, frequency of use—all call for special consideration in the choice of a crane. That's why it's wise to discuss your problem with a Shepard Niles specialist. It's much less costly to install the *right* equipment in the beginning—than to make important changes later.

MAIN AND AUXILIARY HOISTING UNIT—Recommended for duty where there is a wide range in the capacity handled. Auxiliary hoist handles lighter loads at greater speeds than can be obtained with the main hoist.

It costs you nothing to get the facts. May we place our extensive material-handling experience at your disposal?

Shepard Niles

CRANE & HOIST CORPORATION

Makes and sells all three lifting tools for airborne shop loads

CRANES • Overhead

HOISTS • Cab Operated

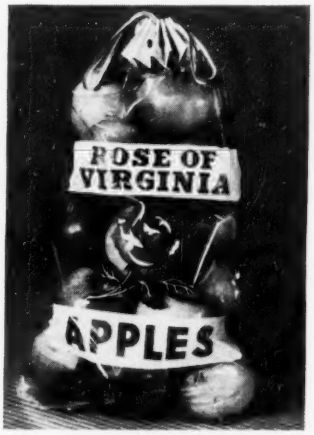
HOISTS • Floor Operated

422 SCHUYLER AVENUE • MONTOUR FALLS, N. Y.

Mass., and offered commercially by the Holiday Coffee Corp., a subsidiary, the new coffee is stated to dissolve instantly even in cold water.

In the manufacture, soluble compounds, with flavor and aroma retained, are first removed from the roasted and ground beans in liquid extract form. Then, after rapid cooling, this extract is fed continuously into a high-vacuum drying chamber. The fine-grained crystalline substance is the end product.

The makers say that the flavor and aroma of the beverage made from these crystals successfully parallel those of coffee made in the usual manner.



Drawstring Film Bag A

Latest "see the product" development is a special Pliofilm bag featuring a drawstring closure. It offers the consumer top rigidity for easy opening, is conveniently carried by the string loops, and has numerous re-use values.

Made by Milprint, Inc., Milwaukee, this item is known as the Zip-Lok bag. In its manufacture, the bottom is shaped by cutting the corners, and heat sealing completes the sack.

After the fresh fruit or vegetables have been consumed, the bag will prove handy for shopping, for storing cold foods, for carrying swim suits, and many other uses.

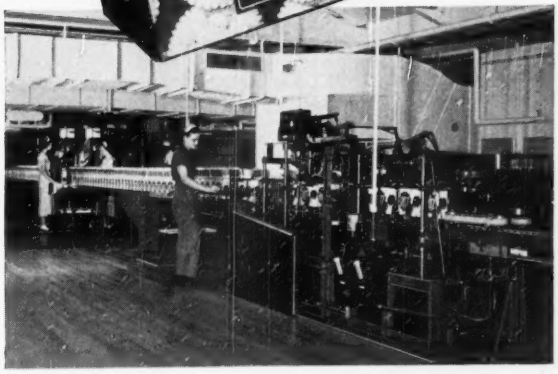
Intended for fresh heavy produce, the bag is available in numerous sizes.

Finely Milled Cocoa B

A novel type of cocoa which is milled so fine that 99.9 percent will pass through a 325 mesh screen is being produced by Cook Chocolate Co., Chicago.

Called Microfine Cocoa, this new

NO TRICK AT ALL!



Installation of Pneumatic top closure equipment at new Houston Bakery of National Biscuit Company

The easy opening RITZ CRACKERS carton is handled on PNEUMATIC MACHINES

PACKAGING of such a tremendous family favorite as RITZ CRACKERS is in the nature of a colossal assignment. You've got to have good protection for such a perishable product. You've got to have a carton that opens easily, that's attractive—and strong enough to stand up under plenty of handling. And you've got to turn them out in a hurry!

It's no trick at all for National Biscuit Company and their Pneumatic packaging equipment. And it's the same story with leading producers of all kinds of packaged products the country over. You'll find more of them using Pneumatic machines than any other kind. Why? Because of their smooth, speedy, trouble free performance —and because, when all is said and done, the money-saving efficiency of Pneumatic machines means—"lower cost per container".

PNEUMATIC SCALE CORP., LTD., 91 Newport Avenue, Quincy 71, Massachusetts. Branch Offices in New York, New York; Chicago, Illinois; San Francisco and Los Angeles, California; Seattle, Washington.

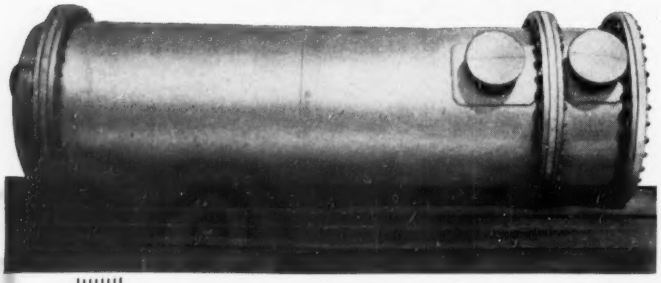
POWDER FILLERS

VACUFLOW POWDER FILLING MACHINES are now manufactured and sold by Pneumatic Scale Corp., Ltd. Rotary and single head units are available for accurate, dustless handling of freeflowing and non-freeflowing materials. Speeds range from 20 to 300 per minute. Pneumatic invites your inquiries on powder filling problems.

PNEUMATIC **PACKAGING AND BOTTLING MACHINERY**

Heliarc welded . . .

WITHOUT FINAL WARPAGE OF THE SHELL



Aluminum Shell and Tube Heat Exchanger, one of two on the order 40" diameter 10' tube length. This unit is made of all aluminum, type 2S except the bolts, which are steel. Heliarc welded. The unit has a number of shell baffles, resulting in 6 shell passes. The welding-in of these shell baffles created serious warpage problems for the Heliarc welding. However, DOWNINGTOWN was able to complete these exchangers *without encountering any final warpage of the shell.*

We of DOWNINGTOWN solicit your inquiry for heavy duty shell and tube equipment:

Alloy materials, including aluminum, inconel, nickel, phosphor bronze, or welded copper. Many of these are welded by Heliarc. Bimetal and finned tube jobs, to our own performance designs. Impregnated graphite jobs for very high corrosion resistance. Special stainless, for difficult service conditions.

Design and construction meet standard of A.S.M.E. or other agency specified by customer. All equipment of our design is sold on a guaranteed performance basis. We also fabricate to customer's drawings. Modern facilities available for checking welding operations by X-RAY. Write on your letterhead for DOWNINGTOWN literature on shell and tube heat exchangers.

DOWNINGTOWN IRON WORKS
DOWNINGTOWN, PA.
HEAT EXCHANGERS

item is processed in specially engineered equipment. Manufacturer states that it is actually fine enough to be sieved through a screen having 105,625 openings per sq. in.

Product is available in natural and dutch processes, with cocoa butter content ranging from 9 to 16 percent.

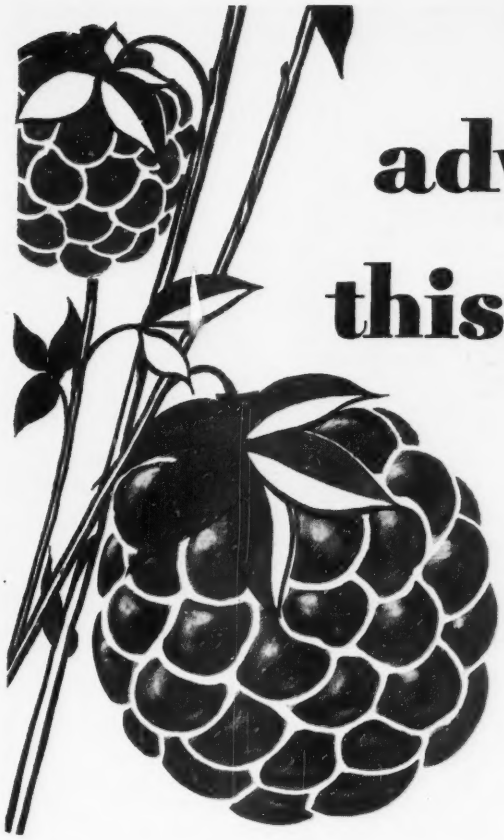
Quince Jelly Offered A

New item from H. J. Heinz Co., Pittsburgh, is quince jelly, in a 10-oz. tumbler jar. Distinguished in this new spread is the aromatic and piquant flavor of the fresh quince fruit, and the company reports that the product accordingly has attracted considerable response in its initial distribution. The quince was originally introduced into America from Persia (Iran) and Greece.

This Box Talks! B

A candy box that speaks is an unusual item with broad novelty appeal. When the record fitted in the top is hand turned, it says, "Hello Sweetheart."

Made by Plastic Service Co., Los Angeles, the clear-view package is formed of Lumarith, transparent plastic product of the Celanese Corp. of America. —*End*



Take advantage of this *RASPBERRY* flavor

It is the result of a series of original discoveries made in our laboratories in the course of research extending over a period of many years.

For the first time the flavor alone of sun-ripened raspberries has been lifted with absolute precision and converted into a tremendously powerful flavor material with physical characteristics specialized for commercial uses.

Its absolute uniformity is the result of completely controlled, synthetic construction. Its sure, solid raspberry flavor is the result of systematic research and exact knowledge.

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KEEPING FAITH WITH NATURE

NATURE ENDOWED APPLES with important health values. Although ascorbic acid (Vitamin C) is among these, the content is not high or uniform because of variations in species, soil, and climate. When processed into juice, the ascorbic acid naturally present is largely destroyed with resulting losses in flavor and quality. Yet consumers rely on fruit juices for Vitamin C, and justly expect integrity of flavor and color.

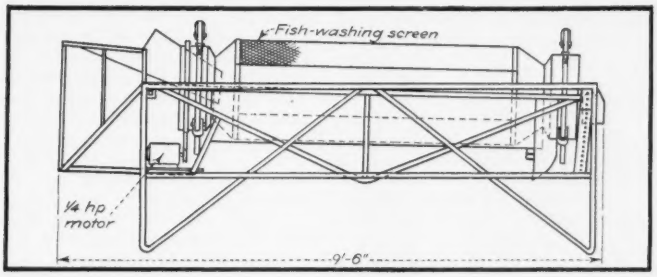
Enrichment with ascorbic acid provides an easy solution to these twin problems, permitting a label claim of standardized Vitamin C value, while helping to achieve new high standards of *color* and *flavor*.

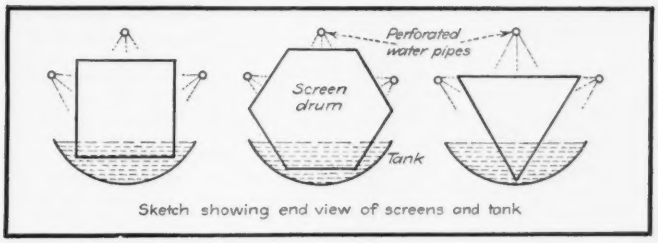
You Keep Faith with Nature doubly when you enrich your apple juice with Vitamin C.

'ROCHE'
ASCORBIC ACID *for*
retaining Nature's goodness

VITAMIN DIVISION • HOFFMANN-LA ROCHE INC. • NUTLEY 10, NEW JERSEY

New Technology





Sketch showing end view of screens and tank

Mechanical Washing of Fish Before Cutting Improves Keeping Quality of Fillets

Organoleptic spoilage, as detected by odor of the fillets, becomes evident very much earlier in unwashed than in washed fish. And washing in an acid phosphate-sodium nitrate solution does not improve the keeping quality of the fillets.

These points were disclosed in experiments conducted at the Pacific Fisheries Experimental Station, Vancouver, B. C., to determine effectiveness of the machine illustrated. In place of the circular drum usually used, 3- to 6-sided drums of easily cleaned, heavy-gage, non-corrosive ½-to-1-in. mesh screen were used. The 3-sided screen proved satisfactory for small fish but not for large species. Lower part of the drum is immersed in a tank of water, changed continuously by sprays of water directed on the screen. Speed of rotation of the drum may be altered by means of a variable speed reducer.

Brill, lincod and chum salmon were used. Three lots of twelve fish were treated separately as follows: (1) Fish were dressed and filleted on clean boards without washing, and the two fillets from each fish were wrapped separately in cellophane, than stored at 33 F.; (2) fish were headed and dressed without washing, then placed in the rotary washer in 7 gal. water at 45 deg F. and washed for 1 min. at a screen speed of 30 rpm. Screen was then tipped and fish were washed into container of running water. They were promptly filleted on boards which had been scrubbed with 1 percent sodium hypochlorite solution and thoroughly rinsed. Boards were washed with a stream of water during the cutting process. Filets were wrapped and stored at 33 F.; (3) fish were treated exactly as in (two), except that 7 gal. of solution containing 0.1 percent each of sodium acid phosphate and sodium nitrite were used in the washer.

Results of the experiments indicate the superior keeping quality of fillets prepared from washed fish.

Digest from "The Effect of Mechanical Washing of Fish on the Keeping Quality of Fillets Prepared From Them," by H. L. A. Tarr and A. W. Lantz, *Progress Reports of the Pacific Coast Stations*, No. 81, 80-83, Dec. 1949.

Shrimp Keep Better If Alkali Treated

A method of processing shrimp to improve its tenderness, water retention, appearance, eating quality and general palatibility, has been patented.

The method comprises soaking raw shrimp in a dilute solution of an alkali salt, such as disodium phosphate, for sufficient time to effect an ionic base exchange reaction between the salt and the protein without gelantinizing the meat of the shrimp.

Thus treated, shrimp may be cooked in boiling brine, cooled in ice water, then drained and served, or frozen for later use.

Digest from U. S. Patent 2,488,184, issued Nov. 15, 1949, on an application dated Feb. 6, 1946, to G. Gernatz, N. H. Volle and F. E. Deatherage, assignors to The Kroger Grocery & Baking Co., Cincinnati.

Many Factors Influence Freezing Rate of Meat

Both internal and external factors affect the time of cooling meats. The former include thermal conductivity, specific heat, latent heat, specific surface, and nature of surface of the cooled body. The latter include temperature, conductivity, specific heat, density, and degree of agitation of the external meduim. In the present study, data are given on the internal factors of kind of meat, and proportions of fat and moisture in the meat, also on the external factors of different packages and different air velocities.

In beef rounds frozen in an air blast at —25 F., ice crystals ranged in size from small intra-fiber crystals near the surface to large extra-fiber crystals at a depth of 4 in. Meats containing a large percentage of fat froze more quickly than lean meats. No differ-

INDEX TO ABSTRACTS

FISH AND MEAT
Mechanical Washing Before Cutting Ups Fillet Keeping Quality 117
Shrimp Improved by Alkali 117
Many Factors Affect Meat Cooling .. 117

FRUIT PRODUCTS
Apples Helped by Calcium 118

DAIRY
Evaporated Milk Fortification 118
Certain Organisms Improve Blue Cheese 118

CONFECTIONERY
Non-Softening Confection 119

DEHYDRATION
Dehydrofreezing Improves Peas 119

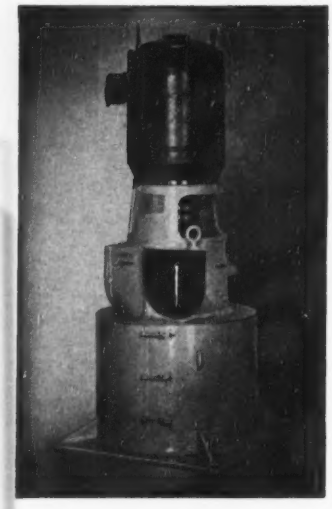
CEREAL PRODUCTS
Expanded Cereal Product 120
Composition of Roasted Coffee 120

BAKING
Improved Cake Mix 122

MISCELLANEOUS
Salt Lowers Thermal Resistance of Tomato Juice Spoilers 124
Non-Weeping Oleo 124

PUREEING
PULPING
JUICING
SHREDDING
BLENDING

For Food and Food By-Products



Rietz

DISINTEGRATORS

Cut Costs

Differential discharge feature saves power and improves product; stainless steel contact surfaces quickly serviced and cleaned; vibrationless vertical design requires minimum foundation and floor space.

10 STANDARD MODELS
5 TO 300 HP

Meet rigid sanitation requirements.

Experienced application Engineering Service available.

Rietz
MANUFACTURING CO.
441 FOLSOM ST.
SAN FRANCISCO 5, CALIF.

Write for *FREE* illustrated Bulletin #520

ence was noticeable in the freezing rates of beef, lamb, pork, and veal, when allowances were made for differences in fat and moisture content. Aging and grinding of beef did not materially change its freezing rate, but the latter was progressively increased by augmenting the velocity of the air from less than 50 fpm. (natural air movement) to 200 and 500 fpm. No further increase was noted, however, when the velocity was raised from 500 to 1500 fpm. Packaging naturally affects the freezing rate of meat, which decreases with any increase in the insulating value of the package.

Digest from "Factors Affecting the Freezing Rate of Meats," by J. M. Ramsbottom, P. A. Goeser, and E. J. Strandine, *Refrigerating Engineering*, 1188-91, Dec. 1949.

FRUIT PRODUCTS

Apples Often Benefitted By Calcium Treatment

Calcium lactate is the most suitable Ca salt for use in firming apple slices. Until recently, $CaCl_2$ was recommended for this purpose, but at times it left a salty flavor in the finished product. An additional advantage of the lactate is that it is less corrosive of metal equipment.

Calcium may be applied in numerous ways. If apples are too soft for pie making, the fresh fruit may be treated just before it is used in a pie. In the case of canned or frozen apples, the manner of applying will depend on the particular process used in the plant. If there is pre-soaking in salt brine, the Ca salt may be dissolved in this solution. If water blanching is used, the Ca salt might be placed in the blanching water. In the vacuum process, Ca may be added to the water or syrup used to break the vacuum. Or the Ca may be applied as a separate dip or bath at some stage of the operation, preferably before blanching.

Digest from "Fresh, Canned, or Frozen Pie Apples Often Benefit By Calcium Treatment," by Z. I. Kertesz, *Farm Research*, 3, Jan. 1950.

DAIRY

Evaporated Milk Fortified With Anti-Anemia Metals

Direct addition to milk of active forms of anti-anemia metals—iron, copper, and manganese—is impracticable because they accelerate the rate of oxidation of oxidizable vitamins and increase rancidification in butterfat. According to a recent patent, however, milk may be fortified with these factors if they are in a non-ionizing state, chemically inactive while in the milk, but capable of resuming chemical activity upon entering the digestive tract.

The metals are inactivated by producing a complex colloidal structure in which they form the nuclei of water-insoluble, assimilable colloid particles. Inactivation is further promoted by producing an absorption reaction whereby the dispersed metallic compounds are encapsulated in protective sheaths. The preferred protective colloid is casein, or a combination of casein and albumin, although zein and soybean protein may be used.

Metallic caseinate, prepared as a soft colloidal mass, is dispersed in concentrated skim milk by means of a colloid mill, and there is yielded a cream-like emulsion. A supply is prepared in advance, equal to about 3 percent of the weight of the finished fortified milk, the proportion being such as to provide definite minimum quantities of anti-anemia metals in the product.

Whole milk is concentrated in accordance with standard practice, kept air-free, and standardized as to ascorbic acid. To it is added an amount of metallic caseinate (air-free aqueous dispersion) calculated to provide specific quantities of metals in the final product. This mixture is heated and filled into cans, which are then sealed in a steam atmosphere and sterilized under pressure. The product has marked nutritional qualities not possessed by other evaporated milk.

Digest from U.S. Patents 2,481,414-5, issued Sept. 6, 1949, on applications dated Apr. 30, 1945, and May 1, 1945, respectively, to George E. Grindrod, Oconomowoc, Wis., assigned to Wisconsin Alumni Research Foundation, Madison.

Certain Lipolytic Organisms Improve Blue Cheese Flavor

Addition of a culture of *Candida lipolytica* to pasteurized milk to be used in blue cheese improves the flavor score and increases total volatile acidity of the resulting cheese. There is a marked difference, however, in the ability of 11 strains tried to effect these changes. And cultures of *Alcaligenes lipolyticus*, *Achromobacter lipolyticum* and *Pseudomonas fragi* did not improve the flavor or cause an appreciable increase in total volatile acidity.

An effort was made to find a substitute for the normal milk lipase which is responsible for development of flavor in blue cheese. (This enzyme is destroyed by pasteurization.) Certain lipase-producing microorganisms were added, as pure cultures, to pasteurized milk used for cheese making. Cheese was cured at 48-52 F. at a relative humidity of 90-95 percent, and scored at the end of 4 and 12 weeks for mold,

flavor and defects. Determinations of total volatile acidity were also made. Results, presented in 3 tables, indicate a relationship between total volatile acidity and flavor score.

Digest from "The Use of *Candida lipolytica* Cultures in the Manufacture of Blue Cheese From Pasteurized Homogenized Milk," by C. E. Parmelee and F. E. Nelson, *Journal of Dairy Science*, 993-99, 1949.

CONFECTIONERY

Non-Softening Confection

Preparation of a solid, edible product of comparatively high fat content, characterized by ability to withstand, without melting, any temperature encountered under varying climatic conditions in any part of the world, is the object of a recently patented process.

It is stated that the process may be used to produce chocolate mixtures for use in ice cream or bakery trade, for coating and enrobing confections, for sweet milk chocolates, or for medicinal foods containing cod liver oil.

The method calls for heating a mixture comprising edible fat, an edible non-crystalline powdered material, sugar, and sufficient water to dissolve a major part of the sugar at the temperature of heating. Heating is continued until water content is less than 10 percent.

Digest from U. S. Patent 2,487,931, issued Nov. 15, 1949, on an application dated May 1, 1947, to H. Lataner, Vinton, Va.

DEHYDRATION

Dehydrofreezing Improves Quality of Stored Foods

Combining the advantages of two methods of food preservation—dehydration and freezing—a new method of processing is said to eliminate some of the disadvantages of each. Dehydration alone gives desirable reduction in volume and weight, but also entails loss of quality. The latter occurs in the final hours of dessication necessary to insure stability against microbial activity, which is only achieved long after the desired reduction in weight and volume has taken place. Freezing alone preserves quality, but it has the disadvantage of relatively high cost of storage and transportation. Combination of the two processes gives desired loss of weight and volume, and retention of fresh quality.

In dehydrofreezing peas, it was found that dessication could be carried to the extent of about 50 percent

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THE MODERN AIR CONVEYOR SYSTEM

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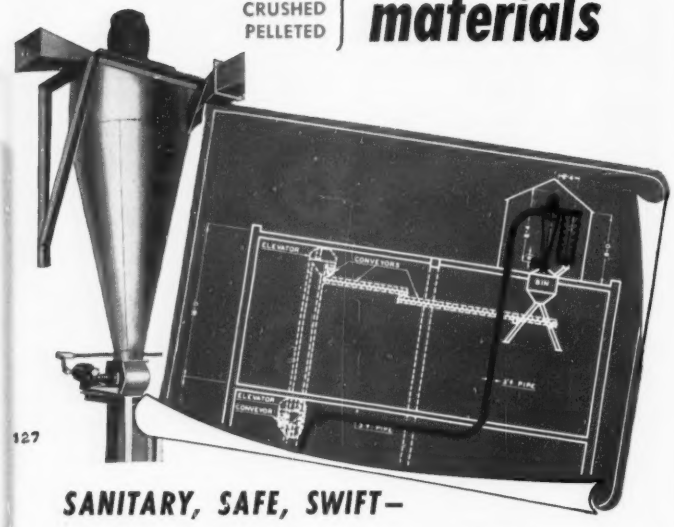

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Pneu-Vac, the modern air conveyor system, is fast replacing obsolete bucket elevators and screw conveyors. Specially engineered for individual food-processing needs, Pneu-Vac prevents contamination and infestation, eliminates dust, improves working conditions, and helps step up production. Its greater speed and lower maintenance cost are other important money-saving features. Investigate how Sprout-Waldron's sanitary Pneu-Vac system can modernize your bulk materials handling and greatly increase your plant's efficiency. Write for Bulletin 18-C. Address Sprout, Waldron & Co., Inc., 35 Waldron Street, Muncy, Penna.

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reduction in weight without significant change in organoleptic quality, evaluated on cooked samples. Thus, dehydrofrozen peas of 50 percent weight reduction were comparable in quality to control samples of conventionally frozen peas, and a panel of 150 tasters was unable to distinguish between the two products. This was true also in the case of samples stored at—10 F. for 1 yr. When dessication was carried beyond 50 percent, deterioration in quality became apparent.

Dehydrofrozen apples appear to be superior to the conventionally frozen product, with better texture when cooked in pie. Freedom from "drip" during thawing simplifies the packaging problem. It appears possible also to obtain dehydrofrozen apple slices free from enzymatic browning by the use of sulphurous acid, even though the sulphite content is less than 25 ppm., as SO_2.

Preliminary experiments with dehydrofreezing have yielded encouraging results with peas, apples, carrots, potatoes, apricots, cherries, and boysenberries. Asparagus failed to give a satisfactory product.

Digest from "Dehydrofreezing Improves Food Quality," by R. R. Legault and W. F. Talburt, *Refrigerating Engineering*, 1175-77, Dec. 1949.

CEREAL PRODUCTS

Expanded Cereal Product Is Made From Meal

A new method of producing puffed cereals, using meals from grains, legumes, and the like, mixed with an expanding agent, has been patented.

In the process, the meal is thoroughly mixed with 0.5 to 5.0 percent water-expandible clay, then with a small amount (less than 3 percent) water. The moistened mixture is transformed into a plastic mass by heating to a temperature above 212 F., then subjected to a high pressure which is suddenly released.

This sudden expansion causes the mass to expand and become porous, and also facilitates its subsequent cooling to form a crisp, friable solid about 15 times its original volume.

Digest from U. S. Patent 2,489,267, issued Nov. 29, 1949, on an application dated April 3, 1944, to C. W. Chapin, Chicago, assigned to Allied Mills, Inc.

Composition of Roasted Coffee

Contained in roasted coffee are a large number of chemical compounds, and some of these undergo more or less regular changes in concentration during roasting and storage. By use of special colorimetric technics that

(*Turn to page* 123)

"OLD STUFF!"

Non-inflammable

CELLU-LOK®

an EMULSION adhesive bonds

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ACETATE to ENVELOPE STOCK or CHIPBOARD

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TRENTWELD TUBING

helps ROSS cut costs

Cutaway showing TRENTWELD Tubing in Ross "SSCF" Exchanger

The new Ross "SSCF" Exchanger, engineered and manufactured by Ross Heater and Mfg. Company, Inc., Buffalo, N. Y. is a low-cost, all stainless steel, exchanger. It is significant that in this interesting development TRENTWELD was included among the important components: TRENTWELD Large Diameter Tubing forms the shell, while the condenser tubes are TRENTWELD Full Finished.

More and more manufacturers are looking to TRENTWELD for the answer to their stainless steel tubing application problems. That's because TRENTWELD is made in a *tube* mill by *tube* engineers . . . who roll and weld stainless and high alloy tubing exclusively.

Our staff of metallurgists and engineers can help you apply stainless steel tubing to your equipment—better! Try TRENTWELD! One call from you puts our years of experience at your call.

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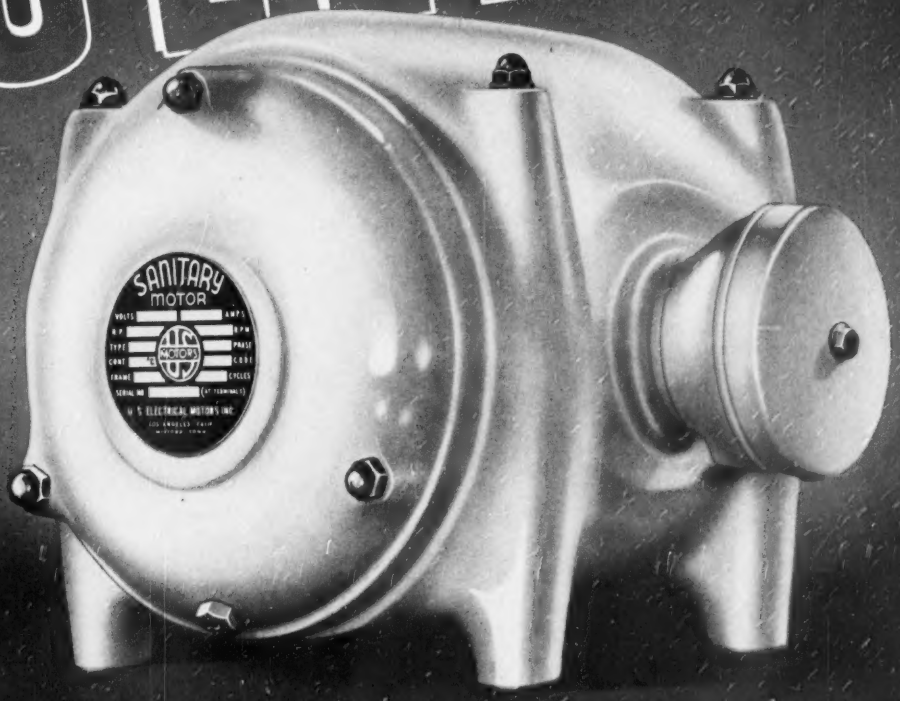
TRENTWELD

STAINLESS STEEL TUBING

CLEAN



U.S. Sanitary MOTOR

(See next page)

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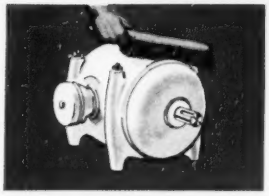
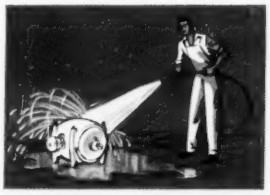
TO INCREASE YOUR PRODUCT'S *sales appeal*

Customers buy through the eye. After you have striven to give your product the best in design and appearance, why tolerate an old-style, unkempt motor? By selecting the dynamically-contoured *U. S. Sanitary Motor* your product presents greater sales appeal. This magnificent motor is gracefully designed and is finished in glistening white baked enamel. It permanently maintains immaculate appearance and gives plant workers new incentive to keep equipment clean. It meets all sanitary codes. It costs only a few dollars more than run-of-the-mill motors. Equip your machines with this attractive motor. You'll have dependable power and most advanced design. The U. S. Sanitary motor embodies the features that built U. S. Motors' reputation for highest quality—asbestos-protected windings, solid, indestructible rotor, annealed steel laminations, and streamlined, shielded housings.

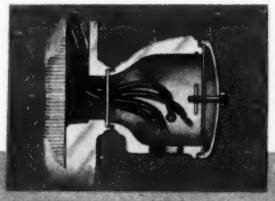
Ask for descriptive Bulletin 1554 featuring U. S. Sanitary Motor.



EASY TO CLEAN



WASHABLE



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allow rapid determination of very small amounts of some of the constituents, progress of these changes has been followed.

Pyridine, readily detected by smell in freshly roasted coffee, increases during roasting. Furfural is found in greatest amount in lightly roasted coffee, but decreases with heavier roasting. Aldehydes, mostly acetaldehyde, increase with the degree of roasting, as does acetone also. Diacetyl and acetylmethylcarbinol are each present to the extent of 15 μg. per g. in a normal roast, but in lesser amounts if the coffee is over-roasted. Volatile phenols increase with roasting from 31 to 110 μg. per g. H_2S is present in fresh roasted coffee (2.5-3.5g. per g.), but mercaptans, thiols, and organic sulphides are not.

During storage there is no loss of pyridine or furfural; aldehydes, acetone, and phenols decrease slightly. The H_2S is lost in the first 2 weeks of storage. About half the diacetyl is converted to acetylmethlcarbinol and accounts for some of the loss in aroma. Many of the volatile substances are very persistent in coffee despite their low boiling points. Samples 2-3 yr. old and extremely stale still contained pyridine, furfural, diacetyl, acetylmethylcarbinol, aldehydes, acetone, and volatile phenols.

Losses of volatiles occur during boiling of coffee or reheating it, also volatile phenols and H_2S are produced, and these account for flavor changes.

Less volatile substances are also involved in coffee aroma and flavor. Roasted coffee can be subjected to sweeping with air, or to a high vacuum, without appreciably impairing its "cup value", though considerable loss of aroma takes place.

Digest from "The Volatile Constituents of Roasted Coffee," by E. B. Hughes and R. F. Smith, *Journal of the Society of Chemical Industry*, Vol. 68, 322-27, Nov. 1949.

BAKING

Improved Cake Mix

Increased weight and volume in sponge cake, as well as improved keeping qualities, are objects of recent patent.

The method comprises replacing 15 to 20 percent of the wheat flour in the mix with a finely divided, low starch-high protein oat fraction. This fraction may be mixed with the wheat flour and incorporated in the batter in the usual manner, or it may be a part of dry mixes that contain all the ingredients required for baking.

In preparing the oat fraction, oat groats are pulverized, with the fine (high starch) portion removed by

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Niagara Falls, New York
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304

aspirating, bolting or screening, and the remaining coarse fraction reground to at least 50 mesh.

Digest from U. S. Patent 2,487,069, issued Nov. 8, 1949, on an application dated July 31, 1945, to Sidney Musher, New York City, assigned to Musher Foundation.

MISCELLANEOUS

Salt Lowers Heat-Resistance Of Tomato Juice Spoilers

Addition of salt to tomato juice, in concentrations varying from 1-8 percent, causes progressive reductions in thermal resistance of *B. thermoacidurans*. Effect of 1 percent salt was very slight; 2 percent reduced destruction time 20 percent; 4 percent, 30 percent; and 8 percent; 40 percent.

These were results obtained from an investigation of the influence of acids, salts, sugars, spices, sodium benzoate and ascorbic acid on the thermal resistance of *Bacillus thermoacidurans* in tomato juice.

Sucrose and dextrose enhanced the heat resistance of the test organisms, it being shown that incorporation of 50 percent of either increased destruction time 200–300 percent. Lactic, citric and acetic acids, were more effective than salt. In concentrations of 0.5, 1, and 2 percent, average reductions effected by lactic acid were 58, 75, and 91, respectively. Citric acid was practically as effective, while acetic was somewhat less so. Black pepper, oil of clove, and sodium benzoate exerted a slight influence, and ascorbic acid was ineffective.

Digest from "Effect of Acids, Salt, Sugar, and Other Food Ingredients on Thermal Resistance of *Bacillus Thermoacidurans*," by E. E. Anderson, W. B. Esselen, Jr. and C. R. Fellers, *Food Research*, 499-510, Nov.-Dec. 1949.

Non-Weeping Margarine

Production of margarine that has high moisture-retaining properties, that does not manifest leakage, and in which rancidity is materially retarded is the object of a recent invention.

These characteristics are obtained by incorporation, in the oil employed for the margarine, of a mixture of mono-, di-, and tri-alkyl citrates, or a mixture of mono-, di-, and tri-alkylene citrates, —the alkyl or alkylene groups to contain at least 14 and preferably 16 carbon atoms. Also incorporated by the same method is an aliphatic monocarboxylic acid mono-ester, or di-ester, of glycerol, or both.

Digest from U. S. Patent 2,485,638, issued Oct. 25, 1949, on an application dated Dec. 4, 1948, to C. M. Gooding, Staten Island, N. Y. H. W. Vahlteich, Englewood, N. J., and R. H. Neal, deceased, late of North Bergen, N. J., assigned to The Best Foods, Inc., New York City.

—*End*

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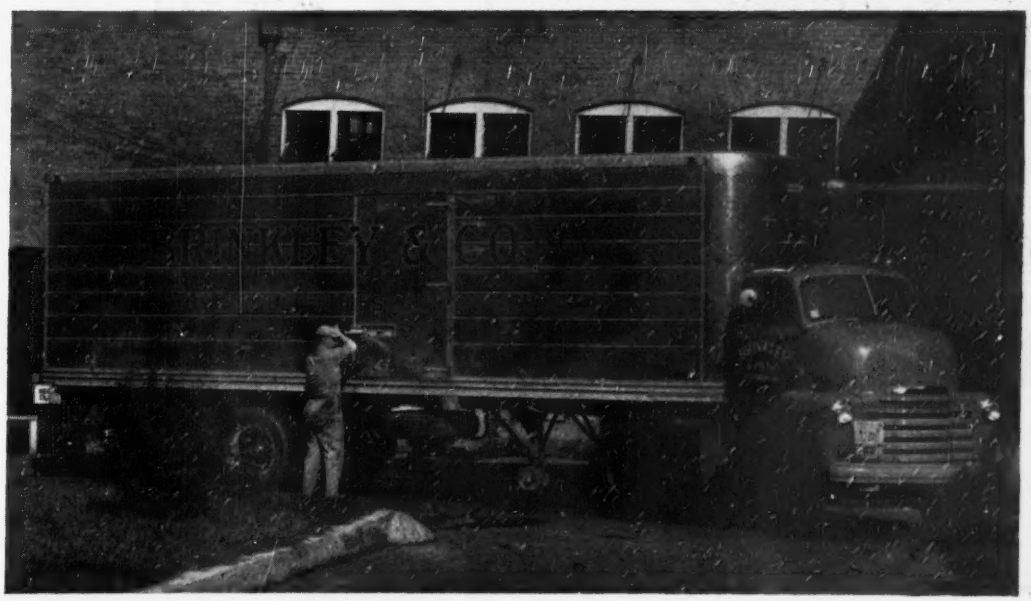
From low selling price to high resale value, you're money ahead with Chevrolet trucks. Chevrolet's rock-bottom initial cost—outstandingly low cost of operation and upkeep—and high trade-in value—all add up to the lowest price for you.

CHEVROLET



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Plastic coating sprays out to preserve woodwork.

Mothproofing Spray protects clothes quickly and easily.

SENSATION OF THE PACKAGING INDUSTRY

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Everyone is talking about the new products that spray or come from cans under pressure—Whipped Cream, Plastic Sprays, Insecticides, Deodorants, Air-Conditioners, Perfumes, Colognes and others. But the big point is—most of the cans used are Crown Spra-tainers, for Spra-tainer was the First and is still the Number One light-weight propulsion can. Spra-tainer has no-side-seam—no-top-seam. This is made possible by Crown Can's exclusive patented method of producing *seamless construction*. Spra-tainer holds *more pressure, has less leakage*. If your product is liquid or sprays, find out what Spra-tainer can do for you. Ask to have a Crown Sales Representative call.

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Food Industry News

Farmers' Group Asks and Receives Answers to Consumer Costs

In a meeting headlined by controversy over national farm policy, questions from farmers about the cost of processing and distributing food stole the spotlight for a while at the National Farm Institute in Des Moines, held in February.

The questions were not a general rehash of the old complaints against the "middleman." They were chiefly the sharp barbs of Richard Stephens, vice-president of the Iowa Farm Bureau Federation. They ranged from "what are we doing to shift Americans toward a livestock diet?" to "what is the productivity of labor in food processing plants?"

On hand to handle the answers was a panel consisting of Paul S. Willis, president, Grocery Manufacturers of American, Inc.; C. C. Preeure, president, National Association of Retail Grocers of the U. S., and John C. Brennan, vice-president-secretary, Middle Western Division, Great Atlantic & Pacific Tea Co. Don Montgomery of the Washington office, CIO United Automobile Workers, represented labor on the panel.

Distribution Costs

To a question by Stephens about what has been happening to the costs of distribution, Brennan gave these figures: In 1933, the housewife got 76.4¢ worth of food for her food dollar, leaving 23.6¢ for distribution costs. In the last quarter of 1949, the A&P was giving the housewife 85.6¢ of food for her food dollar, a gain of 9¢ of food made possible by lower distribution costs.

Brennan cited a one-story warehouse in Kansas City which allowed a 50 percent gain in tons handled as one way this gain for the consumer has been accomplished.

Farmer Stephens pressed the panel for a more precise answer to the question: "Why is it that prices to the farmer have gone down 20 percent or more recently and prices to the consumer hardly at all?"

Here, Willis pointed out that there were only three ways a food processor can radically reduce his outlay cost—by cutting executive salaries, by reducing promotion and advertising, and by reducing dividends. Any of these methods hurts the business, he said.

When Montgomery criticized the effect of advertising Farmer Stephens found himself in the role of defending the food processing industry. He cited the "eat more pork" campaign, which over the past couple of months has helped the largest peacetime pork crop in our history to American dinner tables. Stephens cited a 42 percent rise in pork sales in one Des Moines butcher shop as the direct result of the advertising sponsored by the American Meat Institute.

Stephens brushed aside the possibility of reducing food costs by cutting wages in processing plants on the grounds that these wages are in line with other industries. But he did push hard to find out what was happening to productivity in food plants.

Willis reported that productivity was lagging behind pay increases, but expressed hopes that new machinery coming on the market would bring an improvement.

What about productivity in retail stores?

It's receiving the attention of both chain and independents, Brennan and Preeure assured Stephens and the audience, which consisted largely of farmers.

A question from the floor supported Stephens in his probing into why prices to the consumer have not followed the downturn in prices received by farmers.

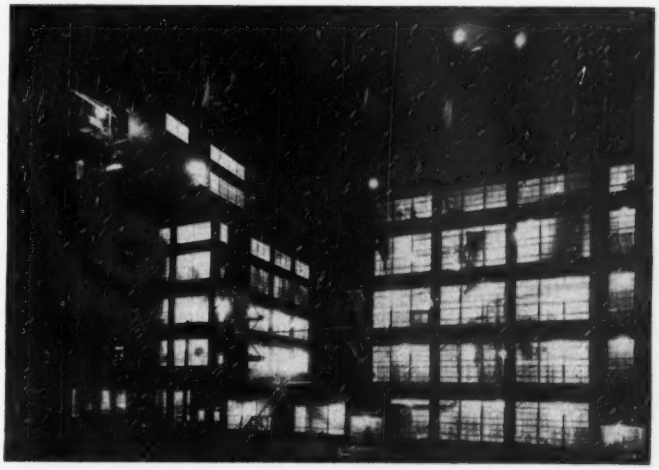
"It's not retail markup which is holding up prices," Preeure said. "Our margins have narrowed, as compared with the 1930's."

Another question from the floor was about prepackaging of meats. Brennan said it was still in the experimental state; that it increased the cost of handling and selling, but speeded up service to the customer. "We can't tell you what the result will be; the consumer is the boss about this, as he is about the way we run our whole business. We'll have to wait and see."

Olive Oil Controls

All types of olive oil have been removed from import control of the Agriculture-Import Order. The action is in line with the Department of Agriculture's general policy of encouraging export and import trade by removing at the earliest possible date the import control of specific commodities which are normally imported by the U. S.

(Program for IFT 10th Annual Meeting follows. News resumes on 130)



New Soya Plant

Glidden Co's. new $3,500,000 soya extraction plant was recently opened in Indianapolis. Operating on a 24-hr. schedule, the plant will process 250 tons of soybeans a day. This unit completes the first phase of Glidden's postwar program in which more than $15,000,000 has been spent for new plants and additions to already existing units. It brings to 35 the number of factories Glidden operates (See page 134).

Institute of Food Technologists

Edgewater Beach Hotel, Chicago, Ill. **May 21 to 26, 1950**

Sunday, May 21,
Morning and Afternoon

Council Meeting, President Carl Fellers, presiding.

Evening

Social Hours.
Committee Meetings.

Monday, May 22, Morning

General Session, President Carl R. Fellers presiding.

Introduction of Charles L. Smith, Continental Can Co. and chairman, Local Arrangements Committee.

Welcome Address: Mayor Martin H. Kennelly, Chicago.

Address: Carl R. Fellers.

The Relationships and Similarities of the Pharmaceutical and Food Industries: Ernest H. Volwiler, president, American Chemical Society.

Money and Credit in The Changing World: Guy E. Reed, Chicago Banker.

Modern Trends in Technological Education: Henry T. Heald, president, Illinois Institute of Technology.

Origin and Growth of IFT: S. C. Prescott, Dean Emeritus, MIT.

Afternoon

Babcock Award Luncheon: Paul F. Sharp, President Elect presiding.

About Stephen Babcock: E. B. Hart, University of Wisconsin.

Presentation of Babcock Award to Recipient: C. G. King, The Nutrition Foundation.

Concurrent Sessions

A. Symposium: *Chemical Agents and Residues in Foods*, Bernard L. Oser, Food Research Laboratories, presiding.

1. From the Viewpoint of the Grower: Frank App, Seabrook Farm Corp.
2. From the Viewpoint of the Food Technologist: W. A. Britten, Beech-Nut Packing Co.
3. From the Viewpoint of the Container Manufacturer: L. V. Burton, Packaging Institute, Inc.
4. From the Viewpoint of the Law: M. F. Markel.
5. From the Viewpoint of the Consumer: A. A. Schaal, Good Housekeeping Bureau.

B. Industrial and Production: *Cereal Technology*, J. H. Nair, Continental Foods, Inc., presiding.

6. Some Baking Industry Problems and Solutions: A. G. Hackett, Drake Bakeries, Inc.
7. Deterioration of Stored Grain due to Moisture: Max Milner, Kansas State College.
8. Technology in the Manufacture of Breakfast Cereals: S. F. Brockington, Quaker Oats Co.
9. The Role of Enzymes in Milling and Baking Technology: W. F. Geddes, University of Minnesota.
10. Products Control in the Baking Industry: Ralph W. Mitchell, Purity Bakeries.
11. Milling Technology: Del B. Pratt, B. A. Eckhart Milling Co.

C. Research Investigations — Section A—George F. Stewart, Iowa State College, presiding.

12. Effect of High Voltage Cathode Rays on Amino Acids in Fish Muscle: B. E. Proctor and S. Bhatia, Mass. Institute of Technology.
13. Effect of Ante-Mortem Treatment of Hogs on the Quality of the Cured Meat: N. E. Gibbons and Dyson Rose, National Research Council, Canada.
14. Biochemistry of Meat as Related to Tenderness: S. A. Husaini, F. E. Deatherage, and L. E. Kunkle, Ohio State University.
15. Effect of Boning on Cooking Losses and Palatability of Beef: Pauline Paul, Mary L. Morr, Lyman Bratzler, and Margaret A. Ohlson, Michigan State College.
16. Post-Mortem Changes in Stored Meats. II. The Effect of Atmospheres Containing Carbon Dioxide in Prolonging the Storage Life of Cut-Up Chicken: W. S. Ogilvy and J. C. Ayres, Iowa State College.
17. The Suspending Power of Carrageenin: R. C. Rose and W. H. Cook, National Research Council, Canada.
18. Detection of the Deterioration Products of Autoxidizing Milk Fat by Infrared Spectrometry: Albert S. Henick, Quartermaster Food and Container Institute.
19. The Effect of Temperature on the Bacterial Infection of Shell Eggs: J. Wolk, E. H. McNally, and N. H. Spicknall, Department of Agriculture.

C. Research Investigations — Section B—Louis B. Howard, University of Illinois, presiding.

20. Nature of Thermal Death Time Curves for P. A. 3679 and *Clostridium botulinum*: C. R. Stumbo, J. R. Murphy, and Jeanne Cochran, Food Machinery and Chemical Corp.
21. Heat Transfer in Commercial Glass Containers During Thermal Processing: I. S. Fagerson and W. B. Esselen, Jr., University of Massachusetts.
22. Preservation of Vegetables with Subtilin and Mild Heat: A. A. Anderson, H. D. Michener, and G. S. Bohart, Western Regional Research Laboratory.
23. Some Effects of Processing on the Nutritive Properties of Proteins: R. R. Baldwin, R. Thiessen, Jr., and J. R. Lowry, General Foods Corp.
24. Factors Influencing Tomato Paste Quality. Pectic Changes During Processing: R. J. McCulloch, B. W. Nielsen, and E. A. Beavens, Fruit and Vegetable Chemistry Laboratory.
25. The Effects of Dielectric Blanching on the Quality of Canned Vegetables: J. S. Moyer, K. C. Holgate, and W. B. Robinson, New York State Agricultural Experiment Station.
26. Drying by Infra-Red: A. C. Shuman and C. H. Staley, General Foods Corp.
27. A Pilot Scale Study of Shell Egg Thermo-stabilization: H. E. Goresline, R. E. Moser, Jr., and K. M. Hayes, Department of Agriculture.

Evening

Meeting:
National Research Council, Committee on Food and Nutrition: Chairman—C. G. King, Scientific, Nutrition Foundation, Inc., chairman.

Mixer

Tuesday, May 23, Morning

Section Officers Breakfast.

Concurrent Sessions.

A. Symposium: *Fish and Fishery By-Products.* H. L. A. Tarr, Pacific Fisheries Experimental Station, presiding.

28. Bacterial Spoilage of Fish and its Control: Ernest Hess, Food and Agricultural Organization of the United Nations.
29. Problems in Handling Fresh and Frozen Shrimp: E. A. Pieger, University of Louisiana.
30. The Effect of Storage on the Quality of Frozen Fish: W. H. Hampton, General Foods Corp.
31. Some Engineering Aspects of the Freezing, Storage and Transport of Fish: O. C. Young, Pacific Fisheries Experimental Station.
32. Fishery Products as a Source of Animal Protein: Hugo W. Nilson, Fish and Wildlife Service.
33. Commercial Processing of Frozen Fish with Ascorbic Acid: J. C. Bauernfiend and G. F. Siemers, Hoffmann-La Roche Inc.
34. Some Chemical and Biological Tests Showing the Effect of Processing on Fish Proteins: W. H. Hastings, University of Washington.

B. *Canning Technology:* Ray B. Wakefield, Gerber Products Co., presiding.

35. Short High-temperature Sterilization and Aseptic Canning Methods: W. McK. Martin, Schwarz Engineering Co.
36. Unforeseen Corrosion in Tinplate Caps for Glass Containers: E. F. Kohman, Campbell Soup Co.
37. Induced Convection Heating in the Sterilization of Canned Cream Style Corn: Paul Wilbur, Food Machinery and Chemical Corp.
38. How We Use our Pilot Plant: D. DeFelice and Eric Beu, General Foods Corp.
39. A New Principle for Agitating in Processing of Canned Foods: L. E. Clifcorn, G. T. Peterson, and J. M. Boyd, Continental Can Co.
40. Color Measurement of Tomato Purees: S. G. Younkin, Campbell Soup Co.
41. Several Practical Quality Control Measures: H. B. Rogers, Jr., Phillips Packing Co., Inc.

C. *Research Investigations*—Section A—John Ayres, Iowa State College, presiding.

42. Some Factors Influencing the Functional Properties of Egg Whites: Caroline Perkins Clinger, Arlene Young, Inez Prudent, and A. R. Winter, Ohio State University.
43. Resting-Cell Fermentation of Egg White by Streptococci: A. M. Kaplan, Mathilde Solowey, W. W. Osborne, and H. S. Tubiash, Department of Agriculture.
44. Storage Studies on Fermented Dried Egg White: Frances Carlin and John Ayres, Iowa State College.
45. Egg Powder of Greatly Improved Stability: Leo Kline, Helen L. Hanson, R. F. Feeney, and Hans Lineweaver, Western Regional Research Laboratory.
46. Butylated Hydroxyanisole as an Antioxidant for Fats and Foods Made with Fat: L. R. Dugan, Jr., H. R. Kraybill, Louise Ireland, and F. C. Vibrans, American Meat Institute Foundation.
47. The Use of Antioxidants in Deep Fat Frying: Louis Sair and L. A. Hall, The Griffith Laboratories, Inc.
48. Improved Food Products Using Dried Inactive Brewers Yeast: E. F. Glabe and Pauline F. Goldman, Food Technology, Inc.
49. Effect of Starch Variety and Initial Processing on Gelatinization Characteristics. H. A. Campbell and F. Hollis, Jr., General Foods Corp.

C. *Research Investigations*—Section B—Z. John Ordal, University of Illinois, presiding.

50. The Growth Initiation of Bacteria in Defrosted Eggs: S. E. Hartsell, Purdue University.
51. Bacteriophage Activity in Lactic Dairy Cultures: F. E. Nelson and C. E. Parmelee, Iowa State College.
52. Difficulties of Control in Quantitative Studies of Ultrasonic Bactericidal Effects: R. McL. Whitney and Lillian A. Russell, University of Illinois.
53. Studies on the Possibility of the Transmission of Salmonella by Cooked Fowl: Dorothy L. Husseman and Margaret A. Wallace, University of Wisconsin.
54. The Mode of Action of Sodium Benzoate: Roy E. Morse, Monsanto Chemical Co.
55. *Escherichia Coli* as an Indicator of Contamination of Some Foods. R. H. Vaughn, University of California.
56. Thermophilic Methane Fermentation of Cannery Waste: K. E. Duggan and C. J. Wilder, Oregon State College.
57. Vitamin B_{12}—Active Substances in Fish Products: H. L. A. Tarr and B. A. Southcott, Fisheries Research Board of Canada.

Afternoon

Executives Luncheon, Roy C. Newton, Swift & Co., presiding.

The Importance of Agricultural Develop-

ment to Food Processing: A. B. Kline, American Farm Bureau Federation.

Evening

Nicholas Appert Banquet: Carl R. Fellers, presiding.

Presentation of Nicholas Appert Medal: Colonel Rohland A. Isker, Chairman, Chicago Section IFT.

Acceptance: Thomas M. Rector, Vice President, General Foods Corp.

Short History of Chicago Section, IFT; E. S. Stateler, Associate Editor, FOOD INDUSTRIES.

Wednesday, May 24, Morning

Food Technology Editorial Board Breakfast. Concurrent Sessions.

A. Symposium, *By-Products of the Packing House Industry*: Victor Conquest, Armour and Company.

58. The Use of Packing House By-Products for Animal Feed (Swine and Chicks): O. H. M. Wilder, American Meat Institute Foundation.
59. Importance of Livestock in Agricultural Economy: E. N. Wentworth, Armour and Company.
60. The Role of the Food Technologist in the Manufacture of Canned Meats: V. R. Rupp, Kingan and Co.
61. Pharmaceuticals Derived from the Packing House Industry: S. W. Hier, The Wilson Laboratories.
62. The Technology and Utilization of Gelatin and Bone Meal: W. F. Bronson, Wilson & Co.
63. The Packing House as a Source of Nutrition for Dogs and Cats: H. E. Robinson, Swift & Co.

B. *Candy Technology*, Emil Mrak, University of California, presiding.

64. Confectionery Sweeteners: E. Meeker, Manufacturers and Consumers Service.
65. Problems in Chocolate Liquor Production: J. Alikonis, Paul F. Beich Co.
66. The Problem of Chocolate Bloom: H. A. Neville, Lehigh University.
67. Trouble Shooting in the Marshmallow Field: T. J. Otterbacher, Corn Products Sales Corp.
68. Some Problems in the Manufacture of Hard Candy: A. V. Cramer, F&F Laboratories.
69. Antioxidants in Fat-Containing Candies: Helen M. Robinson, Southern Regional Research Laboratory.

C. Research Investigations—Section A—Alvin I. Nelson, University of Illinois, presiding.

70. Prevention of Sucrose Hydrate in Frozen Fruit Products: J. E. Brekke and W. F. Talburt, Western Regional Research Laboratory.
71. Dehydro-frozen Apples: F. Talburt, L. H. Walker, and M. J. Powers, Western Regional Research Laboratory.
72. Preparation of Frozen Apple Concentrate: L. H. Walker, C. C. Nimmo, and D. C. Patterson, Western Regional Research Laboratory.
73. Preparation and Storage of Frozen Cooked Poultry and Vegetables: Helen L. Hanson, H. Margaret Winegarden, Mary B. Horton, and Hans Lineweaver, Western Regional Research Laboratory.
74. The Effect of Feed on Bone Darkening of Frozen Young Chickens: Ethyl Shelor, S. R. Cecil, J. G. Woodroof, and W. E. DuPree, Georgia Agricultural Experiment Station.
75. Indirect Immersion Freezing of Fruit and Vegetable Products: G. S. Smith and M. W. Cole, Western Regional Research Laboratory.
76. Survival of Microorganisms in Frozen Concentrated Orange Juice. L. S. Faville, E. C. Hill, and E. C. Parish, Citrus Experiment Station and Florida Citrus Commission.
77. Survival of Microorganisms in Frozen meat: W. L. Sulzbacher, Department of Agriculture.

C. *Research Investigations*—Section B—M. L. Anson, Continental Foods, Inc.

78. Some Observations on the Browning Reaction: H. H. Beacham and M. F. Dull, University of Pittsburgh.
79. Isolation and Characterization of Peach Tannins: G. Johnson, M. M. Mayer, and D. K. Johnson, Colorado Agricultural Experiment Station.
80. A study of Blackening and Fluorescence in Potatoes: Ferne Bowman and Flora Hanning, University of Wisconsin, Madison, Wis.
81. Fluorescence Changes in Solutions of Acetaldehyde and Ammonia and of Glucose and Glycine: J. A. Pearce, National Research Council, Canada.
82. Isolation and Identification of Reversion Components in Hydrogenated Soybean Oil.: A. I. Schepartz and B. F. Daubert, University of Pittsburgh.
83. Proper Conditions for Determination of Lipase Activity: R. Hubata and G. H. Benham, Illinois Institute of Technology.
84. Studies on the Peroxidase in Acid Foods: E. A. Nebesky, W. B. Esselen, Jr., and C. R. Fellers, University of Massachusetts.
85. Observations on the Fining of Wines with Casein: L. Meis, R. O'Neal, and W. V. Cruess, University of California.
86. A Method for Maintaining Free Sulfur Dioxide Content in Wine: H. Y. Young and E. H. Wiegand, Oregon State College.

Afternoon

IFT Business Meeting and Luncheon. Concurrent Sessions.

A. Discussion Group—Frozen Foods Committee—E. H. Wiegand, Oregon State College, presiding.

B. *Sanitation in the Food Industry*, Donald L. Truax, California Packing Corp., presiding.

87. The Sanitation Program of the National Confectioner's Association: Gerald Doolin, National Confectioner's Associatoin.
88. Sanitation in a University Food Technology Curriculum. E. M. Mrak, University of California.
89. Sanitation Problems in the Frozen Food Industry. Kenneth Dykstra, Birdseye- Snider Research Laboratories.
90. Design and Construction of Buildings as They Relate to Food Plant Sanitation: Austin Company.
91. Studies Relating to In-Plant Chlorination: I. I. Somers, National Canners Association.

C. Research Investigations—Section A—George F. Stewart, Iowa State College, presiding.

92. Some Growth Traits of the Food Manufacturing Industry. Allen B. Paul, University of Illinois.
93. Some applications of Statistics to Laboratory Taste Testing. S. Harrison and L. S. Elder, General Foods Corp.
94. Organoleptic Comparison of Large Numbers of Samples: Helen L. Hanson, Leo Kline, and Hans Lineweaver, Western Regional Research Laboratory.
95. A Comparison of Sensory Methods of Measuring Differences in Food Qualities: Elsie H. Dawson and Elsie F. Dochterman, Department of Agriculture.
96. Methodology for Sensory Evaluation of Imitation Peppers: D. R. Peryam and VeNona W. Swartz. Quartermaster Food and Container Institute.
97. Critique of Selected Methods for Measuring Consumers' Preferences for Canned Orange Juice: R. L. D. Morse, Florida State University.
98. Relationships between Amount and Composition of Press Fluid, Palatability, and Other Factors of Meat: A. M. Gaddis, O. G. Hankins, and R. L. Hiner, Department of Agriculture.
99. Quality Evaluation of Fresh, Frozen, and Canned Sweet Corn: W. A. Gould, Fred Krantz, Jr., and James Mavis, Ohio State University.
100. Flavor Evaluation of Canned Fruits and Vegetables Treated with Insecticides: W. A. Gould, Jay Sleesman, Roy Rings, Fred Krantz, Jr., and Margaret Lynn, Ohio State University.

C. Research Investigations—Section B—L. B. Howard, University of Illinois, presiding.

101. Prolonging the Life of Fresh Fruits and Vegetables: W. A. Maclinn, Rutgers University.
102. Peracetic Acid, A New Bactericide-Fungicide; Its Application to Mold Control of Tomatoes: F. P. Greenspan and D. G. MacKellar, Buffalo Electro-Chemical Co.
103. Varieties and Handling of Potatoes for Chip Manufacture: R. C. Wright and T. M. Whiteman, Department of Agriculture.
104. Storage Maturity of Apples in Relation to Quality of Their Frozen Product: J. S. Caldwell, C. W. Culpepper, and G. M. Darrow, Department of Agriculture.
105. The Effect of the Length of Soak on the Quality of Canned and Frozen Montmorency Cherries: Roy E. Marshall, W. F. Robertson, C. L. Bedford, and W. H. Case, Michigan State College.
106. The Preparation and Storage of Peach Juice: F. A. Lee and C. S. Pederson, New York State Agricultural Experiment Station.
107. The Retention of Vitamin C and Color Development in Synthetic Jellies; Effect of Partial Sucrose Replacements: T. P. Human, O. J. Worthington, and E. H. Wiegand, Oregon State College.
108. Relationship of Particle Characteristics to Rehydration Properties of Dehydrated Soups: A. C. Rauch, J. A. Luker, and J. R. Wagner, Quartermaster Food and Container Institute.
109. A Study of the Factors Affecting Measurement of Headspace in Canned Corn. R. G. Tischer and J. G. Darroch, Iowa State College.

Evening

Dinner and Entertainment.

Thursday, May 25, Morning

"Guinea Pig" Breakfast.

A. Symposium. *Military Subsistence of the Future*, Colonel Rohland A. Isker, Associates Food and Container Institute, presiding.

110. Additional Burdens on Agriculture Caused by the Mobilization of Ten Million People into the Armed Forces: Frank K. Woolley, Dept. Agriculture.
111. Problems of Subsistence that May Confront the QMC in the Future: General W. H. Middleswart, Office of the Quartermaster General.
112. Industrial Mobilization Planning and Its Probable Effect Upon the Food Industry: Colonel H. Mackintosh, Office of the QM.
113. Problems Encountered in the Field Relative to Special Purpose Rations During the Last War: W. H. Chambers, Army Medical Center.
114. Progress on Special Rations: Colonel J. S. Kujawski, Quartermaster Food and Container Institute.
115. Civilian Feeding in Time of an Emergency: Robert Goodhart, The National Vitamin Foundation, Inc.

Afternoon

Field Trips.

To Quartermaster Food & Container Institute, Curtiss Candy Co., Swift & Co., Corn Products Refining Co.

Friday, May 26, Morning

Field Trips.

To The Griffith Laboratories, Inc., Kraft Foods Co., National Biscuit Co., Continental Can Co.

Program for Ladies' Entertainment

Sunday Evening

Social Hour for all Conventioners.

Monday

Sightseeing Tour of the City (including stop at Lady Esther's Cosmetic Plant) and late luncheon at the Midway Airport Cloud Room.

Alternate Activities:
- A. Board of Trade Tour.
- B. Merchandise Mart Walking Tour.
- C. Tribune Plant Tour.
- D. Radio Programs.

Tuesday

- A. Tour through Sears and Roebuck Merchandise Testing and Development Laboratory.
- B. Tour of the Palmer House Hotel (a "behind the scenes" look at how a large hotel is run).
- C. Tour through Armour and Company's meat packing plant and tea in its New Products Development Kitchen.
- D. Tour through an ice cream mfg. plant.
- E. Tour through the candy kitchen of a well-known Chicago confectioner.
- F. Radio programs.

Wednesday

Tour of Marshall Field and Company, luncheon in the Wedgewood Room and Fashion Show.

Alternate Activities:
- A. Visit to Chicago Historical Society.
- B. Visit to Lincoln Park Conservatory and Zoo.
- C. Visit to Chicago's Art Institute.

News Continued Next Page→

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Bread Staling Research Reported at Purdue

Results of 2½ yr. of research on bread staling at the Purdue University Agricultural Experiment station have just been reported by Roy L. Whistler. Here is what the report says was learned or confirmed:

(1) Analysis of over a hundred wheat strains, including primitive wheats and mutants, indicate that their starches all contain the usual amounts of amylose.

(2) Four wetting agents, Santomerse 3, Sontomerse D, National Naceonal NRSF, and National Naceonal HG, were found to greatly reduce the rate of retrogradation of corn amylose. Several other wetting agents were also found to decrease the rate of retrogradation somewhat.

(3) Rate of Retrogradation increased as the concentration of the wheat, potato, and corn amylose and wheat amylopectin increased.

(4) With a progressive decrease of average molecular weight of potato and corn amylose through acid hydrolysis, the retrogradation rate first increases to a maximum value and then steadily decreases. Natural wheat amylose has a molecular size such as to give it nearly the maximum rate of retrogradation.

(5) Hypochlorite oxidation reduced the rate of retrogradation of wheat and potato amylose, but there was no marked effect on the retrogradation rate except where very heavy oxidation had taken place. Hence, highly bleached flours will not yield a bread of low staling rate.

CIO Reassigns Unions In Food Field

The CIO will not set up a new union in food processing to compete with the expelled Food, Tobacco, Agricultural and Allied Workers. Instead, three other CIO unions will move in to take over where they can.

The CIO has assigned jurisdiction over cannery workers to the United Packinghouse Workers. Cereal workers will be the target of the Brewery, Flour, Cereal, Soft Drink and Distillery Workers Union. Signing up of tobacco workers in CIO is being left to the Transport Service Employees Union, a union with Negro leadership that already has been active in the tobacco areas.

Organizing efforts of the CIO will be stepped up in these areas. Many employers will be confronted with jurisdictional rivalries, especially if they have a labor contract with the expelled union. The CIO will try to take over the contracts. Where a question exists as to which union the workers wish to represent them—if any—elections may be obtained from the National Labor Relations Board by either of the unions or by the employer.

FTA and five other unions have been kicked out of CIO for adhering to Communist rather than legitimate trade-union policies.

In expelling FTA, the CIO pointed out that the union was deteriorating instead of growing because its leaders were preoccupied with Communist activities. Membership declined from 46,700 in 1947 to 29,370 in 1948 and 22,590 last September, according to the report of the three-man committee that heard the Communist charges against the union. This report, with a recommendation for expulsion, was adopted by the CIO executive board.

The CIO report asserted that, on the basis of figures available from the Bureau of Agricultural Economics, there are 3,000,000 workers who could be organized by FTA. The union claimed its potential membership was between 200,000 and 300,000.

FTA leaders, denying the charges, asserted that similarity of their policies and those of the Communists was only a coincidence.

Give Chemicals in Foods Thorough Going Over

Long range action is expected rather than immediate drastic regulation in the use of chemicals in foods. Several groups are interested in the program officially in Washington, but at early March no immediate change was expected from the present policy of inquiry and discussion.

Food & Drug Administration is leading, with its hearing currently in progress on residues of insecticides, fungicides and other agricultural chemicals on fresh fruits and vegetables. The prospect of this hearing, which began in January, is that many months will be required to explore all phases of the announced inquiry. The tentative schedule already published calls

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for discussion of the need for using these chemicals, until about July 1. After that date the extent and toxicity of any residues will be discussed, probably through the balance of the calendar year. Any standard resulting from this hearing will probably not be effective before 1952, and presumably will apply only to fresh fruits and vegetables.

Two resolutions have been introduced in the House to explore the extent of use of chemicals in the manufacture of foods. However, these had not been officially approved as this issue went to press. The House Rules Committee must first approve bringing one of the resolutions onto the floor of the House, and then approval on the floor will be necessary before a committee can be named to start holding hearings. However, the subject will continue to have Congressional interest for a long time, whether or not the pending resolutions are approved.

National Research Council has indicated that they also will soon be investigating some of "the diverse problems relating to the production of food supply". A conference was held by their Food & Nutrition Board at the turn of the year to discuss the formation of a committee on food protection. Dr. H. E. Longenecker was asked to appoint a committee "to complete organizational and operational plans". It is anticipated that food producers and processors, the chemical industries, and the various professional organizations will be invited to participate jointly in this new activity. Subjects that will no doubt receive most attention from the committee were discussed at the Food & Nutrition Board conference. These included "the use of newer chemicals in the production of an adequate food supply, the introduction of functional ingredients in food processing, and the need for further knowledge in the application of these newer aids in agriculture and food technology."

Meat Company Earnings Remain Below Par

Net earnings for Armour and Company returned to black ink in 1949, when a net profit of $558,189 was reported for the year ending October 29. These earnings compare with a loss of $2,552,547 for the corresponding 1948 period. Sales, including service revenues in 1949 were $1,848,280,443, a little ahead of the previous year's $1,841,509,071.

For the same period, Wilson & Co. showed net earnings of $4,593,497. Sales and operating revenues were $709,371,240, second only to Wilson's

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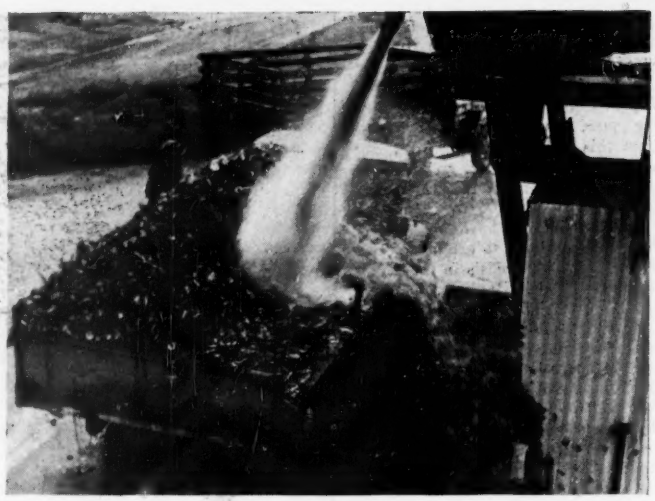

Beet Unloader

This simple but effective method of both washing and unloading sugar beets is used by British to step up output and thus help them supply a large portion of their own sugar ration. Beets are washed off truck and flumed into mill. (Eastern)

record high of $738,293,912 in 1947.

Both Ward and Continental Baking reported declines in earnings and sales for the year ending December 31. Ward's total income came to $80,687,746, compared with $86,701,197 for 1948. Net income totaled $3,172,902 as against $3,685,443.

Continental's total income amounted to $154,342,618, compared with $161,305,608 for the previous year. Net profit in 1949 was $5,543,196, compared with $7,673,101 the year before.

Weigh Economic Factors In Margarine Repeal

The 50-year battle between margarine and butter for the votes of Congressmen was all over but the shouting as FI went to press. The decision came when the Senate voted 56 to 16 to end the Federal taxes and license fees on oleomargarine. The House had passed a similar repealer last year.

1. End the tax of ¼c. per lb. on uncolored margarine, and the 10c. per lb. tax on colored.

2. End the $600 annual license fee on manufacturers, the $480 annual fee for wholesaling yellow, and the $200 fee for wholesaling uncolored margarine; end the annual retailers fee of $48 on colored and $6 per year on uncolored margarine.

Provisions in the Senate Bill, designed to hamper margarine production, lost out in the conference that ironed out differences between the House and Senate Bills. The final Bill, for instance, eliminated Senate provisions that margarine be packaged in triangular shaped packages. Instead, it can be sold in 1-lb. units or ¼-lb. sticks, the same as butter.

Labeling provisions of the Bill have about the same requirements as the Food & Drug Law. There is one special provision, however—that margarine advertising may not make use of dairy terms.

However, 16 states still have their own laws versus yellow margarine. The following 14 prohibit its manufacture—Connecticut, Delaware, Idaho, Illinois, Iowa, Michigan, Minnesota, Montana, New York, Oregon, Pennsylvania, South Dakota, Vermont, and Washington. California and Nebraska do not prohibit the manufacture, but you may not serve yellow oleo in public eating places there.

The only state in this group whose legislature is meeting this year is New York—and even the bullish margarine lobbyists do not expect to win there. So, the next butter-oleo flare-ups will come in 1951, when the other state legislatures meet. These states have about 40 percent of the country's population, so they are worth fighting over.

Margarine has come a long way since the war. A few years ago, 32 states prohibited yellow margarine—now 32 states permit it. The military was forbidden by law to serve margarine to soldiers and sailors; now the only restriction is against using margarine on Navy tables.

Competitive break for margarine comes not only from the removal of the

10c. tax on colored and the ¼c. tax on the uncolored product, but it also will benefit in that it will be sold by thousands of wholesalers and the hundreds of thousands of retailers who did not formerly handle margarine at all, because of the license fees.

Granted that margarine prices vary considerably among brands in the same area, and between areas, here is the price story, in states where all the barriers go down come July:

Assume that consumers are paying, say, 30c. per lb. for white margarine, 33c. for white margarine in the plastic bag, and 41c. for the colored product. After July 1, white margarine disappears, the bag disappears, and—assuming prices of raw materials stay the same—yellow margarine will retail for about 31c. per lb. That is about 1c. or so more than consumers pay now for white margarine, not in the plastic bag. Competition, of course, could knock down that price spread to the point where the price of yellow margarine would be the same as for the uncolored product.

Big loser is Lee Peters, Evanston, Ill., who invented the SqueezeMe margarine bag, and collected the very handsome royalties. It is estimated that about 40 to 50 percent of the 850,000,000 lb. of margarine sold in 1949 was retailed in the plastic bag.

Another loser: Government budgeteers, who note they are losing a source of revenue that turned in $17,500,000 in fiscal 1949.

What beat butter? The factors are well worth understanding by any business man who has to do business with the consumer—or with the Congress:

She Bakes, Too

It might seem like a long way to go—all the way back to the February cherry-pie contests—but its the only excuse we can offer for bringing in Miss Jacqueline Hanneman, of Indianapolis, who won one in Chicago. On the other hand, who wants an excuse? (Wide World)

Guardians OF THE NATIONS FOODS

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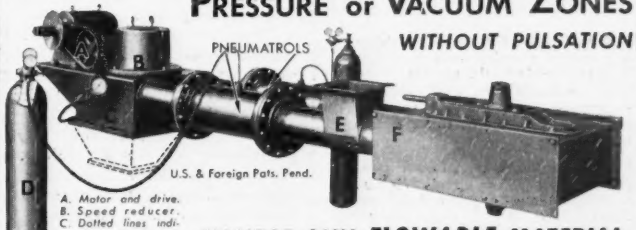
HAPMAN PNEUMATROLS

Now CONVEY CONTINUOUSLY
INTO OR OUT OF
PRESSURE or VACUUM ZONES
WITHOUT PULSATION



A. Motor and drive. B. Speed reducer. C. Dotted lines indicate position of pressurized hopper in actual installation. D. Tanks supplied air source for actuating Pneumatrols in test set-up. E. Receiving hopper. F. Standard take-up for Hapman chain conveyor.

The restricted nature of most new processes prevents securing plant photographs of the Pneumatrol installations now operating successfully. Names will be furnished on request.

HANDLE ANY FLOWABLE MATERIAL

This photo shows the testing set-up prior to shipping an installation of a Hapman circular flight chain conveyor equipped with Hapman Pneumatrols. The pressure-sealed Pneumatrols used with the Hapman pressure-tight, chain-link and flight assemblies, make it possible to convey any flowable material into or out of vacuum and pressure zones intermittently, continuously or it can be processed in motion through these zones. Complete information on request.

HAPMAN CONVEYORS, Inc. 2405-A W. McNichols Road Detroit 21, Michigan

Here's why PlasTex* BELTING is Better For Food Conveying:
RESISTS ACIDS, ALKALIS & GREASES —WITHSTANDS HIGH TEMPERATURES
EASILY WASHED OR CLEANED WITH LIVE STEAM
COMES IN THREE ATTRACTIVE COLORS —GREEN, WHITE AND MAROON
STURDY SOLID WOVEN COTTON BELTING—PLASTIC COAT WON'T PEEL OFF

Buffalo PlasTex* Conveyor Belting is a special plastic-coated belt that is impervious to oils, greases, acids, alkalis and moisture. Easily cleaned — provides long, satisfactory wear without flaking-off or other deterioration.

**PlasTex is the registered trade name for Buffalo Weaving & Belting Company's plastic-covered belting. Makers also of RF&C (rubber covered), latex, solid-woven cotton, and glazed (nitro-cellulose coated) beltings.*

Write for full information and samples to:

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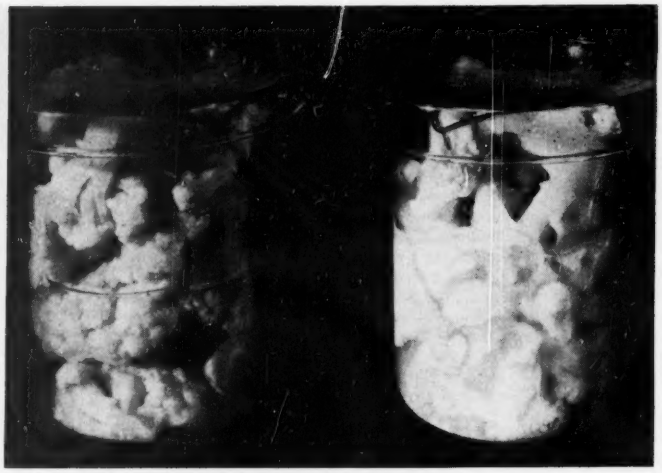


Antibiotic Used on Cauliflower

Two samples of freshly opened cauliflower, both canned with mild heat treatment (8 minutes at 212°F.). To the sample, left, was added 2.5 parts per million of Subtilin (based on total contents of can). Control sample (right) was canned without Subtilin. Samples had been held at room temperature for 31 days prior to opening. Spoilage of the control sample is indicated by bacterial growth (turbidity of brine) and decomposition of the florets. The sample canned with Subtilin has excellent color and aroma, when tasted following five minutes boiling, and had excellent flavor and firm texture. Research was conducted at Western Regional Research Lab. (Also see FOOD INDUSTRIES, Feb., 1950, vol. p. 327.)

1. The high price and scarcity of butter during the war. Also, the stamp value of margarine under OPA, as compared with butter.

2. The wartime shortage of fats and oils, which put a powerful price incentive to the farmer's production of soybeans and cottonseed—the two oils which, between them, now supply about all the oil that goes into margarine.

3. The high standards of quality, palatability, and vitamin-content of postwar margarine.

These factors welded together two potent pressure groups: 1. The city consumer, to whom sky-high butter prices were the symbol of the irritatingly high cost-of-living. 2. A new Southern Cotton-Midwest soybean farm lobby to offset the dairy states farm lobby, which had successfully engineered and maintained the margarine taxes for half a century.

New Soybean Extractor Used at Glidden

With the opening of the Glidden Co's new soybean processing plant at Indianapolis, in February, the Blaw-Knox Rotocel, a newly developed solvent extractor, gets its first large scale application. The new plant also gives Glidden an additional 250 tons daily soybean capacity. It is planned to recover lecithin at the new plant as well as soybean meal and oil.

The Rotocel operates in the horizontal plane with the flake-holding baskets on a revolving rotor. The conventional basket extractor has its process flow in the vertical plane. Among the advantages reported are large savings in building heights, the presence of a fully counter-current flow of the solvent throughout the cycle, a reduction in equipment, ease of operation, and more complete extraction of the oil.

Bakery Inspection Rules Result From Accident

As a result of a serious injury suffered by one of its sanitarians, the American Baking Institute has issued additional safety requirements for all sanitarians making inspections of bakeries.

While inspecting a bakery in Atlanta on January 31, Philip T. McDonald, of the Institute's department of sanitation, had his right arm caught in the mechanism of the auger conveyor of the storage bin. The arm was so badly crushed that amputation was necessary.

Sanitarians making inspections in the future are required to personally throw the master or safety switches.

The switch must then be locked, either under its own mechanism or by a chain. Large colored signs also are to be placed across the switches, warning that a man is working on the equipment. Fuses are also to be pulled from the switch boxes and kept by the inspector during the inspection. Tools are also to be used as much as possible during examinations of equipment.

Beich Named Chairman Of Candy Council

Paul M. Beich, president of Paul F. Beich Co., has been named chairman of the Council on Candy, National Confectioners' Assn., for the ensuing year, succeeding Irvin C. Shaffer, vice-president of Just Born, Inc.

Philip P. Gott, NCA president, also announced the addition to the council of five new members:

V. H. Gies, vice-president, Mars, Inc., and Fred E. Magenheimer, secretary, Maison Au & Magenheimer Conf. Mfg. Co. appointed vice-chairmen; R. B. Schnering, vice-president, Curtiss Candy Co., Bob McCormack, president, Bobs Candy & Peanut Co., and Theodore Stempfel, vice-president, E. J. Brach & Sons. Stempfel, one of the founders of the council, has rejoined the unit to again take an active part in its operations, according to Gott.

Beich declared that "reawakened interest of the largest firms, such as Mars, Brach and Curtiss, in obligations and functions of the council, signifies a healthy recognition of the mounting problems we face, not individually, but as a great industry.

Largest Chemical Meet Slated for New York

Outstanding chemists and chemical engineers from more than 30 countries will gather in New York, in September, 1951, to participate in the largest international chemical conclave in history, it is announced by Dr. Ernest H. Volwiler, president of the American Chemical Society, which will celebrate its diamond jubilee at that time.

Both the sixteenth conference of the International Union of Pure & Applied Chemistry and the twelfth international congress of Pure & Applied Chemistry will convene following the 75th anniversary meeting of the American Chemical Society, scheduled for the week of September 2, according to Dr. Volwiler, who is executive vice-president of Abbott Laboratories, North Chicago, Ill.

This combination of international meetings will be the first of its kind in

LONG on work
but SHORT on the payroll

An ideal worker . . . Certainly! And a Wallace & Tiernan chlorinator is an ideal worker because it applies the In-Plant Chlorination process to your fish cannery, frozen food, or canning plant.

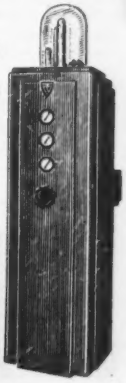
The In-Plant Chlorination process cleans, sterilizes, and deodorizes, thus saving you time, trouble, and money.

It saves you time because this process reduces the length of the clean-up period.

It saves you trouble by preventing slime growth on floors and equipment and by eliminating off-odors.

It saves you money by lowering the cost of clean-up, preventing product contamination, and by increasing production.

Call your nearest W&T Representative and he'll gladly give you complete information on how this machine applying the In-Plant Chlorination process will reduce your costs and increase your profits.



I-26

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CHLORINE AND CHEMICAL CONTROL EQUIPMENT
NEWARK 1, NEW JERSEY • REPRESENTED IN PRINCIPAL CITIES

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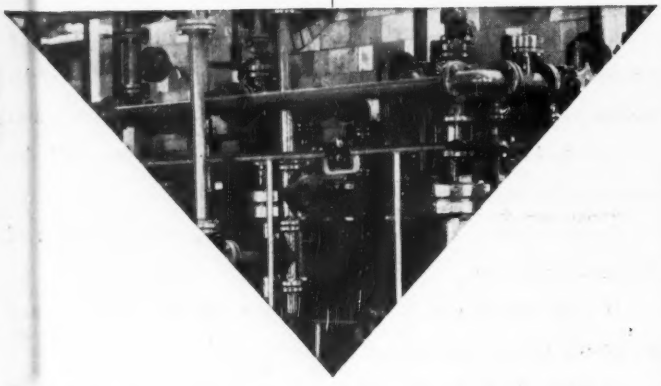
steel pipe

cuts repairs and replacements to a minimum!



The conveyance of corrosive liquids can prove as hard on profits as it is on equipment. It's this realization that has compelled more plants than ever before to install corrosion-resistant saran lined steel pipe. Saran's resistance to most chemicals and solvents reduces shutdowns and lost production! Saves time and labor!

Saran lined steel pipe is available in maximum lengths of 10 feet and in sizes from 1 to 6 inches inclusive. Also available are saran lined diaphragm valves, plug valves, flanges, reducing flanges, flanged fittings, gaskets and fittings with union ends.

Write us today for further information concerning saran lined steel pipe and how it may help solve your corrosion problems. Manufactured by The Dow Chemical Company, Bay City, Michigan, distributed by Saran Lined Pipe Company, Dept. TSP-22.

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SARAN LINED PIPE a DOW product

the United States since 1912, although the International Union met in Washington in 1926 when the American Chemical Society marked its golden jubilee. Part of the Union's 1951 meeting will be conducted in Washington.

New Distribution Plan Set by Snow Crop

A new distribution plan to enable wholesale grocers to handle frozen foods has just been inaugurated by Snow Crop Manufacturers Div. of Clinton Foods, Inc., according to Martin Mathews, vice-president in charge of sales and marketing.

Effective immediately, Snow Crop's frozen foods will have the same status as any other food line. The plan enables wholesale grocers to distribute an advertised brand to member stores without the risks or inconvenience of additional financial investment in large stocks or costly specialized storage and handling facilities.

Mathews explained that more than 85 leading wholesalers from Maine to California have already indicated a willingness to adopt the plan, which has been subjected to extensive pilot tests in selected marketing areas and has been in actual operation for several months in New England, Michigan, Indiana and Southern California.

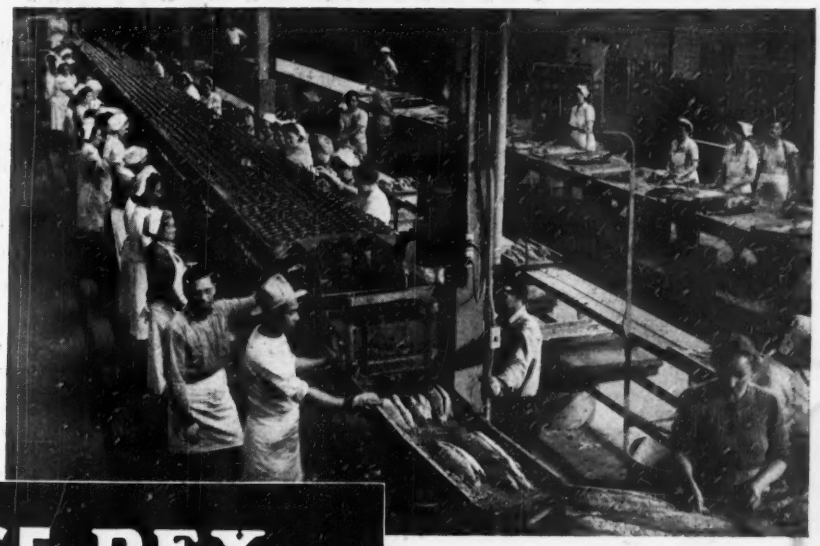
Packaging Groups Meet

A meeting of all the Technical Committees of the Packaging Institute has been called for April 25 by General Chairman Robert de S. Couch, of General Foods Corp. This meeting will be held in Chicago at the Furniture Club in the Furniture Mart, 666 Lake Shore Drive, during the AMA Packaging Conference held during the same week. A luncheon at 12:30 will precede the separate meetings. Both the luncheon and the committee gatherings are open to all who are interested.

Correction

In the article, "Shear—Not Pressure—Harms Egg White," pp. 85-88 Feb. FI, printing errors occurred. Line 3 of Col. 2, top of p. 86, should have read, "Samples of control white that were..." Also, the "What They Did" section, immediately following, contained these mistakes: Col. 1, Para. 3, "chalazae" should read "chalazae"; Col. 1, Para. 7, "Experiment 1,500" should read "Experiment I, 500"; Col. 2, Para. 3, last line should say,"directed partially whipped foam back..." and in Col. 2, Para. 4, numbers "2,4,7,11,13,16" should be in superscript, since they are guides to references at end of article.

don't let CORROSION eat away your profits . . .



USE REX Z-METAL CHAINS

Lots of food processing jobs are plenty tough on chains. Ordinary cast chains won't stand up for long under operating conditions where corrosive influences such as acids, salt water, steam, fish slime, sugar juices and the like are present. That's why Rex engineers developed Z-Metal chains.

Z-Metal makes good chains better. It minimizes wear and deterioration due to abrasion, corrosion and strain. Z-Metal chains will deliver years of dependable service under conditions where ordinary chains would soon fail, and at an original cost of only a few cents more per foot.

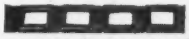
Remember Rex Z-Metal is not a heat-treated malleable iron. It is a carefully alloyed metal considerably more corrosion resistant—more than 30% stronger than the best quality malleable iron.

For all the facts, just mail the coupon.

CHAIN BELT COMPANY REX DRIVE AND CONVEYOR CHAINS

REX

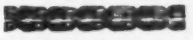
some
Z-METAL CHAINS used in the food industry



REX Z-METAL DETACHABLE CHAINS—for light drive and conveyor service.

REX Z-METAL "1100 SERIES" ROLLER CHAIN—for platform or scraper conveyors.

REX Z-METAL PINTLE CHAIN—for general conveyor and power transmission service.



REX DOUBLE-FLEX CHAIN—for sliding conveyor service where flexing in two planes is required.

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Gentlemen:
Please send me information on Rex Z-Metal Chains.

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Company.....*Dept.*.....

Address.....

City.....*State*.....

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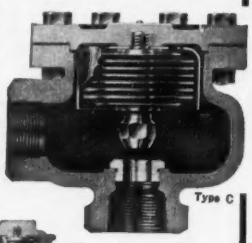
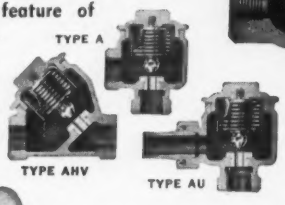
Freeze-Proof Steam Traps

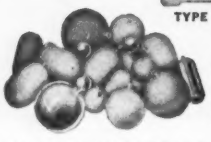
for Every Plant Use

Because they drain completely when cold, these four types of Nicholson steam traps are positively freeze-proof. Can be freely installed outdoors. Universally recommended for use in lines which need not be in continuous use during cold weather, because they are freeze-proof and because their 2 to 6 times average drainage capacity results in minimum heat-up time. The non-air-binding feature of Nicholson traps also notably facilitates steam transfer in severe weather.





Four types: size ¼" to 2"; press. to 225 lbs. BULLETIN 1047.



HIGH-PRESSURE FLOATS—Stainless, monel, steel or plated steel. Welded. In all sizes and shapes; for operating mechanisms and as tanks or vessels. 2-day delivery. BULLETIN 348.

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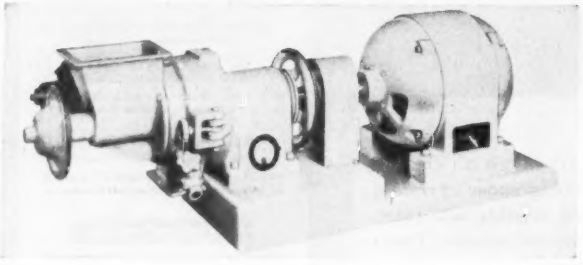

BAUER 8-IN. ATTRITION MILL

GRINDS, MIXES, BLENDS

Any combination of materials capable of being pulverized can be ground, mixed, and blended in this Bauer Single-Disc Attrition Mill. The ingredients are thoroughly dispersed, resulting in complete homogeneity.

The mill illustrated is equipped with a screw feeder which assists the blending process. Accurate adjustment of the discs for coarse or fine grinding is made by means of a large hand wheel with graduated dial. Many patterns of discs are available to meet specific requirements.

Complete information on this and other Bauer Attrition Mills will be gladly furnished. Give us an idea of the kinds and quantities of materials to be processed so that we can make definite recommendations.

THE BAUER BROS. CO.

1740 Sheridan Ave., Springfield, Ohio

F&D Food Standards

Residue tolerances continued to be the most important hearing action at Food & Drug Administration during February. Witnesses from State Agriculture Experiment Stations were staying quite close to the schedule announced in early February. Witnesses from industry were expected to appear from about mid-April to latter June.

Bread standards moved one step closer to official promulgation, when the last briefs were filed by interested parties during February. With two exceptions, the supporting briefs were about as expected. One of the exceptions was the brief filed by the Shortening Institute, which suggested that neither the chemical emulsifiers nor the mono- and di-glycerides be permitted as optional ingredients in bread.

This argument was apparently based on a philosophy of consistency, since the emulsifiers were objectionable and the mono- and di-glycerides were felt to be too similar to be unobjectionable. Swift & Co. filed a separate brief which differed from the Shortening Institute in that it requested approval of the mono- and di-glycerides as optional ingredients.

Atlas Powder Co.'s brief requested inclusion of its emulsifiers and exclusion of the mono- and di-glycerides. This argument was based on lack of evidence of non-toxicity of the latter, and on the fact that the mono- and di-glycerides have been advertised as a means of reducing the quantity of shortening needed and a means for carrying more water in certain bakery products.

Next official move will be the tentative order issued by the Federal Security Administrator. Estimates range from 3 to 6 months for the time required to prepare the tentative order. Since the presiding officer and some of the technical and legal staff of F&DA are now involved in the residues hearing, it is possible that the tentative order on bread standard will not be issued before Labor Day.

USDA Grade Standards

Recent actions by Production & Marketing Administration of U. S. Department of Agriculture on U. S. Grade Standards and related activities include the following:

Canned grapefruit and orange for salad, new, proposed, page 825, February 15 *Federal Register,* written comments received until March 17.

Beans, revised, proposed, page 873, February 17 *Federal Register,* written comments received until March 20. (The proposed revision will eliminate

INDUSTRIAL ENZYMES

Which of These Will Improve Your Products?

Enzyme System	Designation	Availability	Action on Substrate
Pectinolytic	PECTINOL	Commercial	Demethoxylates pectic substances and hydrolyzes them to galacturonic acid. pH range 3.5 - 5.
	Pectin esterase	Experimental	Demethoxylates pectin without hydrolysis of the galacturonic acid chain. pH range 3.5 - 5.
Proteolytic	RHOZYME P-11	Commercial	Hydrolyze proteins to peptides and amino acids. pH ranges 5.5 - 8.5. (Relative amounts of peptides and amino acids will differ for each proteolytic enzyme.)
	Protease 15	Experimental	
	Protease 16	Experimental	
Amylolytic	RHOZYME S	Commercial	Hydrolysis of starch to dextrins, maltose and glucose. Contain both an alpha amylase and a strong glucogenic principle. pH range 5 - 6. RHOZYME S is a purified enzyme; RHOZYME T-22 the crude product.
	RHOZYME T-22	Commercial	
	RHOZYME DX	Commercial	Hydrolysis of starch to dextrins. Heat stable. pH range 5.5 - 6.5.
Lipolytic	Lipase A	Experimental	Hydrolysis of fats to glycerin and fatty acids. pH range 5 - 7.
Lactase	Lactase A	Experimental	Hydrolysis of lactose to glucose and galactose. pH range 6.1 - 7.5.

Commercially available Rohm & Haas enzymes are being used *now* in the following industries:—Fruit juices, jellies and fruit juice concentrates, protein hydrolysates, baking, corn starch industries, fermentation. Have you stopped to think how these materials might improve your product or manufacturing process?

Start with your own natural products which contain pectins, proteins, cellulose, fat, starches or milk sugar. Consider the possibility of changing viscosity, texture, solubility, clarity or filterability of your product at any processing stage. Will the hydrolysis of one of these substrates permit better utilization of others?

Do you want a clearer product—one that filters or presses more readily? Will the end result of hydrolysis be a product that's better utilized, better tasting? Don't forget the possibility of recovering fiber, fat, sugar or protein in waste products.

Whenever you desire mild conditions of hydrolysis, or when you require flexibility in hydrolyzing only one of several components of a natural product, consider Rohm & Haas standardized enzymes. Write us about your problems and ideas. We'll be glad to send you our suggestions, samples, technical literature—or consult with you personally, all without obligation.

PECTINOL and RHOZYME *are trade-marks, Reg. U. S. Pat. Off. and in principal foreign countries.*

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More stuff handled with less effort and cost when your plant is equipped with Colson trucks. Hand trucks, barrel and drum trucks, platform trucks, dish trucks, Lift-Jack Systems, dollies, wheels and casters—all designed for ease of movement, floor saving, extra durability. Less "push" means popularity with workers, profits for you. Write us or consult your phone book for the local Colson office.

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Colson Drum Truck model #6055-65, has ballbearing 10" double steel disc type wheels, demountable cushion rubber tires, rugged lightweight tubular steel frame. Chimb hook locks semi-automatically.

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CASTERS • • LIFT JACK SYSTEMS • • INDUSTRIAL TRUCKS

the special grades for Handpicked Beans and substitute in lieu thereof an Extra No. 1 Grade for all classes of beans, representing "beans of exceptionally high quality suitable for use by the packaging industry." Changes are also proposed in grades for Blackeye Beans, Cranberry Beans, and Pinto Beans.)

An official identification and inspection mark for *poultry and domestic rabbits* has been proposed, on page 799 of the February 14 *Federal Register*. Examples of the mark were included in the printing. No unfavorable comments were received by the 24th of February.

Schedule of Events

April

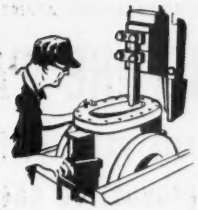
4–7—Michigan State College, 7th annual dairy and food inspectors and sanitarians school; East Lansing, Mich.
7–8—Self-Rising Flour Institute, 16th annual meeting; Buena Vista Hotel, Biloxi, Miss.
18–20—National Fisheries Institute, 5th annual convention; Edgewater Beach Hotel, Chicago.
24–27—American Management Assn., 19th national packaging exposition; Navy Pier, Chicago.

May

1–3—American Oil Chemists' Society, spring meeting; Atlanta Biltmore Hotel, Atlanta.
1–4—U. S. Brewers Foundation, 74th annual convention; Fairmont Hotel, San Francisco.
7–10—Flavoring Extract Mfg. Assn., 40th annual convention; Hotel Traymore, Atlantic City, N. J.
7–11—American Society of Brewing Chemists, annual convention; Hotel Statler, Detroit.
14–18—American Assn. of Cereal Chemists, 35th annual convention; Sheraton Hotel, Chicago.
14–18—Super Market Institute, 13th annual convention; Hotel Stevens, Chicago.
15–17—Millers National Federation, 48th annual meeting; Edgewater Beach Hotel, Chicago.
21–25—Institute of Food Technologists, 10th annual meeting; Edgewater Beach Hotel, Chicago.

June

1–2—American Society of Quality Control, 4th annual convention; Auditorium, Milwaukee, Wis.
5–8—National Confectioners Assn., 67th annual convention and 24th industries exposition; Waldorf-Astoria Hotel and Grand Central Palace, New York City.
12–30—Massachusetts Institute of Technology, 3-week course in food technology; Cambridge, Mass.
20–22—American Dairy Science Assn., 45th annual meeting; Cornell University, Ithaca, N. Y.
29–1—Grocery Manufacturers of America, mid-year meeting; The Greenbriar, White Sulphur Springs, W. Va. —*End*



A DISTINCTIVE FEATURE IN DISC GUIDING

Body guides are machined down to precision tolerances, assuring a perfect guide for the disc and creating a positive center line on which all subsequent machining operations are based.

BODY PRECISION MACHINED TO INSURE PERFECT FIT OF SEAT RINGS

This operation makes inserting the seat rings in a Lunkenheimer gate valve simply a matter of screwing them into position. Parts can be replaced without any machine work or special fitting.

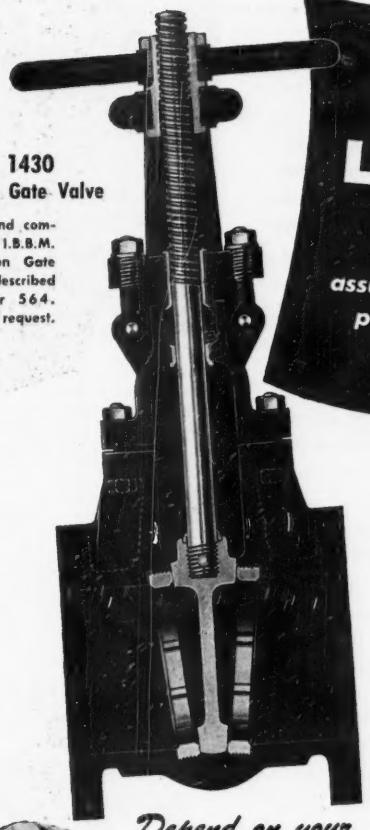


Fig. 1430
Iron Body Gate Valve

Fig. 1430 and complete line of I.B.B.M. and All Iron Gate Valves are described in Circular 564. Mailed upon request.

Precision Made
LUNKENHEIMER VALVES....

assure perfect-fitting, interchangeable parts . . . longer valve life . . . easier, lower-cost maintenance!

THE smooth working efficiency and low maintenance cost of Lunkenheimer Valves were not "made in a day." Behind this superior performance and economy lies long experience, top engineering and metallurgical facilities together with the most modern manufacturing equipment.

Lunkenheimer Valves have a streamlined simplicity of design . . . a minimum of working parts, each part of extra strength, correctly proportioned and perfectly balanced. This assures longer life with lower maintenance expense.

Depend on your* LUNKENHEIMER DISTRIBUTOR *for service and reduced valve inventory!

Many concerns, large and small, have found real savings by depending on the complete stocks of Lunkenheimer Distributors. Capital formerly tied up in slow-moving inventory is available for other uses; losses from obsolescence are eliminated or drastically reduced. Ask your Distributor how he can help you.

ESTABLISHED 1862

THE LUNKENHEIMER CO.

"QUALITY"

CINCINNATI 14, OHIO, U.S.A.

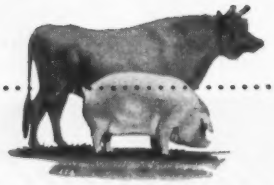
NEW YORK 13 • CHICAGO 6 • BOSTON 10 • PHILADELPHIA 34

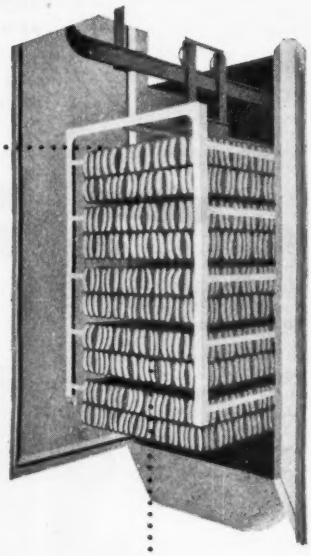
EXPORT DEPT. CINCINNATI 14, OHIO, U.S.A.

ONE OF A SERIES DEMONSTRATING APPLIED LUKENOMICS

SHAVE, SHOWER AND SHINE BEFORE PARADE

. . . or how to give frankfurters and hams extra self-retailing sales appeal and reduce production cost besides

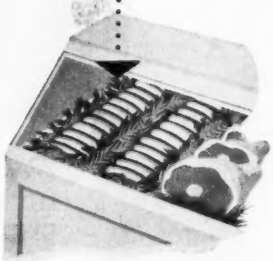




To increase yield and reduce shrink a well-known packer recently replaced existing equipment with overhead hot-water-spray type cookers which accept loaded cages direct from smokehouse, and shower 160° to 185° cooking water over the load. To insure plump, perfectly colored product with maximum flavor, the cook-water is collected by a rust-proof, easy-to-sanitize, stainless-clad steel base tank, reheated, strained and recirculated. Overall production costs dropped materially and retail sales increased without additional sales costs.

Extra benefits like these can be expected whenever Lukenomics is put to work. For Lukenomics is the engineering art of solving the *total* problem posed in considering new equipment . . . not design alone, nor materials, nor fabrication . . . not product quality, nor operating cost, nor amortization . . . but all of these, and more, as they affect process, product, sales, profits. Lukenomics brings to bear not only Lukens own products, services and knowledge of materials but marshals, as well, the highly specialized skills and services of industry's most experienced engineers and equipment manufacturers.

To obtain the advantages of equipment built by fabricators applying the Lukenomics principle, write our Manager of Marketing Service, Lukens Steel Company, 401 Lukens Building, Coatesville, Pennsylvania.



The hot-water-spray type cooker shown is produced by The Globe Company, Chicago. Lukens Stainless-Clad Steel is used in the base pans because it provides all the advantages of solid stainless steel with clad steel economy.

LUKENS

LUKENS STEEL COMPANY

BETTER PRODUCTS FOR BETTER EQUIPMENT

A-6402

Changes in Food Supplies

Stocks

STOCKS in canners' hands on February 1, compared with '49, were reported as follows by NCA.

	Actual Cases (000 omitted) 1949	1950
Lima beans	635	2,625
Green & wax beans	3,508	6,600
Peas	12,590	9,874
Sweet corn	15,228	21,402
Tomatoes	9,743	8,132
Tomato juice	14,902	12,831
Apple sauce	2,450	3,699
Red pitted cherries	449	887
	(Basis 24/2½'s)	
Peaches	8,375	10,460
Apricots	2,736	1,451
Pears	2,135	2,703
Sweet cherries	186	693
	(Thousands of dozens)	
Baby food	53,427	54,065

Storage

FROZEN FISH AND SHELLFISH held in storage February 1, was down to 125,515,984 lb., as against 149,036,231 lb. held a month earlier. Holdings on Feb. 1, 1949 were 127,635,455 lb.

PUBLIC FREEZER occupancy was 5 points below average on February 1, standing at 74 percent. This was a drop of two points from the previous month.

COOLER space stood at 59 percent filled on February 1, representing a decrease of 5 points during January. Average decline for the period is only 3 points.

Production

ICE CREAM production in January was estimated at 31,590,000 gal., a figure 8 percent above the January, 1949, total and 7 percent greater than the 1944-48 average for the month. December-January increase was 8 percent, a sharp contrast to the 6 percent decline the year before, and the 2 percent average gain for the five years.

MARGARINE output was estimated at 79,859,000 lb. in January, compared with 77,689,000 lb. produced in January, 1949. Average January production for the five years, 1945-49 was 68,127,000 lb.

SPRAY-DRIED NONFAT MILK SOLIDS production totaled 44,750,000 lb. in January, an increase of 9 percent over the January, 1949, output, and approximately double the 1944-48 average.

ROLLER-DRIED NONFAT MILK SOLIDS output reached 20,100,000 lb. in January, which was 39 percent greater than January, 1949, and 28 percent larger than the five-year average for the month. Production, however, was about 1,500,000 lb. short of the January peak reached in 1945.

CHICKS produced in commercial hatcheries during January totaled 83,644,000, a 3 percent increase over the output during January, 1949. The five-year average production for the month is 53,266,000.

CREAMERY BUTTER production in January was estimated at 101,165,000 lb., 9 percent larger than for January, 1949, and 12 percent greater than the 1944-48 average for the month. December-January gain, however, was only 5 percent, compared with 10 percent the previous year and a five-year average gain of 8 percent.

AMERICAN CHEESE output for January was estimated at 54,185,000 lb., a 7 percent decline from the previous January, but 14 percent above the five-year average for the month. The December-January gain was only 3 percent, compared with 12 percent the year before, and the recent five-year average increase of 7 percent.

Indexes

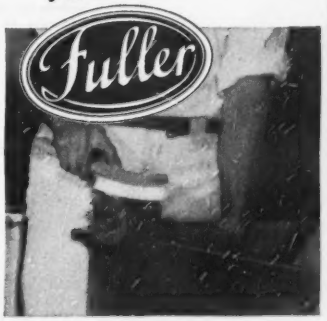
Business Week's index on business activity came to 188.3 for the week ending March 11. The previous week it stood at 185.4; a month earlier it was 191.4, and a year earlier, 195.0.

The commodity index on foods, compiled by the *New York Journal of Commerce*, rose to 172.5 for the week ending March 17. This compares with 169.9 for the previous week, 171.6 for February and 179.6 for March, 1949.

CONSTRUCTION

	Pending (thousands)	Total Awarded— March (thousands)	1950 (thousands)
Bakery	$160	$100	$2,606
Beverages	418	70	2,028
Canning and Preserving	68	.....	400
Cold Storage	700	272	272
Confectionery	.....	.....	368
Grain Mill Products	2,913	801	4,379
Ice, Manufactured	.....	.....	70
Meats and Meat Products	70	300	1,433
Milk Products	350	157	1,441
Miscellaneous	300	1,500	12,095
	$4,979	$3,200	$25,182

ON THE
BEECH-NUT
"SCRUB TEAM"
FOR 20 YEARS

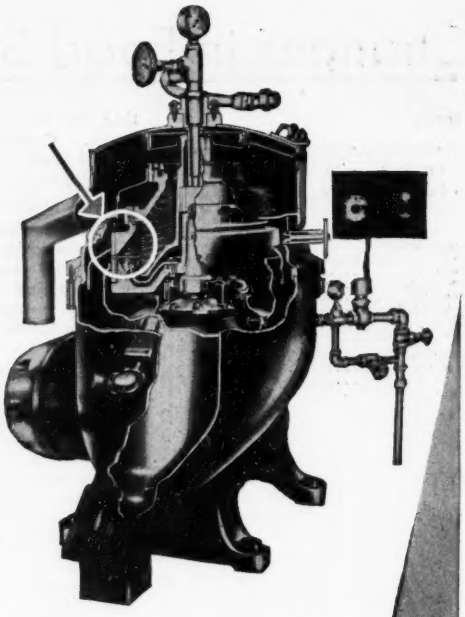


The extreme care exercised at the Beech-Nut Packing Company in maintaining top standards of cleanliness is exemplified in the pictures here of their Baby Food Department. Yet daily scrubbing is hard on brushes. Beech-Nut has used Fuller brushes for 20 years and found that these brushes give excellent service. For further information, phone or write your nearest Fuller representative, or write . . .

THE FULLER BRUSH CO.
INDUSTRIAL DIV., 3640 MAIN ST., HARTFORD 2, CONN.
In Canada: Fuller Brush Co., Ltd., Hamilton, Ont.

ANNOUNCING THE NEW SHARPLES DV-2

A MAJOR ADVANCE IN CENTRIFUGE ENGINEERING



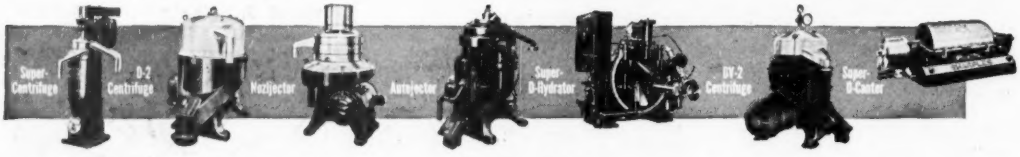
Indicated in the circle is one of the ten solids discharge valves which are externally controlled for *duration* and *frequency* of opening.

Don't overlook the significance of CONTROLLED SOLIDS DISCHARGE introduced in the new Sharples DV-2 Centrifuge. It has made possible high efficiency centrifugal separations that were never practical in the past.

The Sharples DV-2 maintains high efficiency and thru-put capacity, and it adds three important factors: (1) The ability to handle a wide variety of solids; (2) flexible control over the consistency of the solids discharge; and (3) minimized loss of liquid.

It may be that the Sharples DV-2 can extend the economy of centrifugal separation to your processing. If so, it will pay you well to investigate.

Complete operation of the Sharples DV-2 Centrifuge is described and graphically illustrated in Bulletin 1243. Write for your copy today.



THE SHARPLES CORPORATION

2300 WESTMORELAND ST. PHILADELPHIA 40, PA.

Boston • New York • Pittsburgh • Cleveland • Detroit • Chicago • New Orleans • Seattle • Los Angeles • San Francisco

ASSOCIATED COMPANIES AND REPRESENTATIVES THROUGHOUT THE WORLD

Men, Jobs, Companies

EDWARD W. DAVID has been named president of The Charles E. Hires Co., Philadelphia. He has been a high ranking official in the company since 1920, and was vice-president for the last seven years.

GEORGE A. RICHARDSON, professor of dairy husbandry and dairy chemistry at Oregon State College, will receive the $1,000 Borden Award in Chemistry of Milk at ACS's 117th annual meeting in Philadelphia April 10.

LEONARD G. BLUMENSCHINE, president of The Best Foods Inc., New York, has been elected to serve also as chairman of the board. He succeeds William Wardall, who has now left under the retirement plan.

WALTER S. MACK, JR. has been promoted from president of Pepsi-Cola Co. to chairman of the board. He has been president since 1938. Alfred N. Steele, formerly in charge of sales, was named new president.

Industry

Borden Co. has acquired White Dairy Products Co., Raleigh, N. C. No change of personnel or operating policies is planned.

Braun Bros. Packing Co., Troy, Ohio, announces plans for a new $1,000,000 meat packing plant that will more than triple the present plant's capacity.

Brock Candy Co., Chattanooga, Tenn., is considering a $300,000 program for new equipment.

Gerber Products Co., Fremont, Mich., has just purchased the Curtice Bros. Co. plant in Rochester, N. Y. Transfer will take place Jan. 1, 1951.

H. W. Lay & Co. was host to over 3,000 dealers at the opening of its new Jacksonville, Fla., plant. Potato chips, Cornetts, and Fritos will be among products made there.

International Nutrition Laboratories, Mt. Vernon, Wash., recently suffered loss of its soybean milk manufacturing plant in a fire. Damage was estimated at $160,000.

Libby, McNeill & Libby has signed a contract to purchase the Purpura Bros. citrus packing plant in Ocala, Fla.

National Dairy Council has elected the following officers at its annual meeting in Chicago: Milton Hult, president; Ridgway Kennedy, Jr., first vice-president; B. F. Beach, second vice-president; Carl A. Wood, secretary; George E. Wallis, treasurer; and D. M. Raffel, assistant secretary-treasurer.

National Research Corp., Boston, has established the Holiday Coffee Corp. for large scale production of soluble crystal coffee reported to dissolve instantly even in cold water (also see New Products & Packages section for item concerning the new coffee).

Ralston Purina Co. has started work on its new $1,000,000 feed plant in Macon, Ga. New mill is expected to have a capacity in excess of 100,000 tons annually.

Seaboard Packing Corp. has been chartered in Delaware. The new meat packing firm has an authorized capital stock of $300,000.

Seven-Up Co., St Louis, is investigating the possibilities of a bottling operation in Athens, Greece.

Shedd-Bartush Foods, Inc., Detroit, has purchased the Southwest Margarine Co., Dallas. No change in operating personnel is planned.

St. Louis Assn. of Flour & Baker Supply Distributors has installed the following officers for 1950: J. A. Zimmerman, Cahokia Flour Co., president; R. Van Dusen, Hilker & Bletsch Supply Co., vice-president; G. E. Giessing, Valier & Spies Milling Co., secretary; and H. Albrecht, Eberle-Albrecht Flour Co., treasurer.

Western Condensing Co., Appleton, Wis., will open a branch plant in Defiance, Ohio, for whey condensation. The new factory will be located at the Swift & Co. plant there, and it will use whey from the latter's cheese operation.

White City Packing Co.'s plant at Fort Pierce, Fla., was recently destroyed in a $250,000 fire.

Personnel

Nathaniel Barclay has been appointed vice-president in charge of procurement and production for Snow Crop Marketers, subsidiary of Clinton Foods, Inc.

Paul M. Beich has been named chairman of the National Confectioners Assn. He is also president of Paul M. Beich Co., Bloomington, Ill.

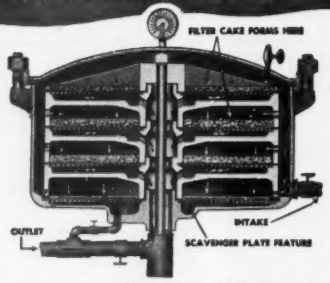
Donald R. Cushman, formerly of Beechnut Packing Co., has joined the Quaker Maid Laboratories of the Great Atlantic & Pacific Tea Co.

G. R. Detlefsen will manage the commercial research department of Pillsbury Mills, Inc., Minneapolis. Former Director R. T. Browne becomes director of marketing, in the grocery products division.

FOR HIGH SPEED, UNIFORM FILTRATION REQUIRED IN FOOD PROCESSING

SPARKLER horizontal plate FILTERS

Capacities 50 G.P.H. to 5000 G.P.H.



HERE ARE A FEW FOOD PRODUCTS THAT SPARKLER FILTERS HANDLE WITH EASE:

Candy Syrup
Chicken Broth
Cider
Egg Albumen
Extracts
Flavors
Honey
Gums
Liquors
Milk
Molasses
Vegetable Oil
Syrups
Vinegars
Wines
Fruit Juices
Alcohols
Alkalies
Beverages

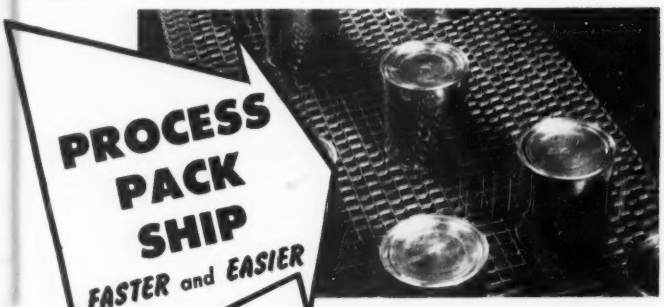
Sparkler Filters operate on a distinctive principle, using horizontal plates, that are particularly efficient in maintaining uniformity in operation over a wide range of pressure, temperature, or viscosity conditions.

Filters water sparkling clear, removes all off-tastes, odors, color, sediment, chlorine, sulphur, algae, pipe rust, etc.

Because filter media are supported on a horizontal plane and filter aids floated into position uniformly, filtration takes place uniformly over entire filtering areas. Flow through filter is always with gravity. The patented scavenger plate filters the last drop, leaving no hold over in batch filtration.

We invite correspondence on your problems. You will receive the advice of filtration engineers with over a quarter of a century experience in a specific field.

SPARKLER MANUFACTURING COMPANY
MUNDELEIN, ILLINOIS



WITH **LA PORTE**
FLEXIBLE STEEL CONVEYOR BELTING

You can step up every food-handling operation from the loading hopper to shipping room with La Porte Conveyor Belting.

Its rugged steel construction provides for long service. The open mesh feature permits quick cleaning with steam or scalding water without removing belt from friction drum. Also allows for circulation of heat, cold, liquid or air around products in process.

Flexible feature assures tight grip of belt on friction drum—eliminating creeping, weaving and jumping. It provides a perfectly flat surface for containers, empty or filled. Made of best galvanized material obtainable. It's the most dependable and economical belt for every process and handling operation.

Write at once for literature and price—no obligation.

LA PORTE MAT & MFG. CO.
BOX 124 LA PORTE, INDIANA

JOHN OCKEN has been appointed manager of the American Dry Milk Institute Laboratory, Chicago. He succeeds C. M. O'Malley, who will be in charge of publicity and public relations.

James W. Donaldson is now general sales manager of Phillips Packing Co., Cambridge, Md.

Robert E. Dunn has been named vice-president of the H. W. Lay & Co., Atlanta.

G. P. Halferty has been elected president of the newly organized Whiz Halferty Canneries, Inc., Seattle. New company takes over Alaska Canneries, Whiz Fish Products Co., G. P. Halferty Co., and Pioneer Canneries.

Lila M. Jones has been named head of the home economics department of H. J. Heinz Co., Pittsburgh.

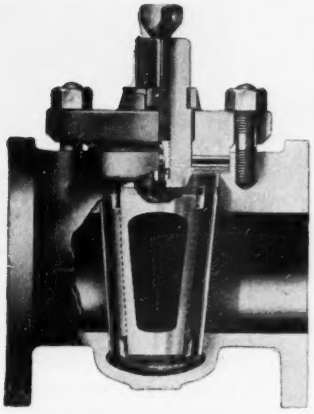
Alex Klopot, president, Apex Packing Co., Chicago, was elected president of Chicago Meat Packers & Wholesalers Assn.

E. F. Kohman reached retirement age on January 31, but is being retained by Campbell Soup Co. on a flexible part-time consulting basis.

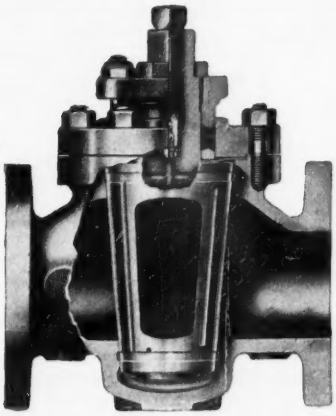
Martin Mathews has been appointed vice-president of Snow Crop Marketers. He will direct sales and marketing activities.

Cecil K. McInnes, Gilbert C. Clarke, and **D. George Caldwell** have been named vice-presidents of Standard Brands, Ltd., Montreal. They will be in charge of bakery products, advertising and sales promotion, and grocery products, respectively.

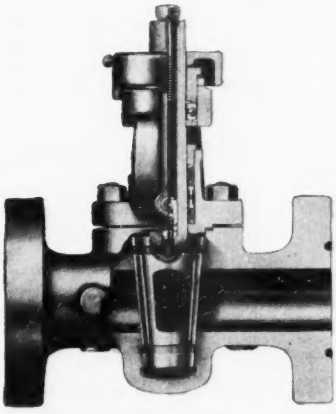
Louis Ratzesberger, Jr., has been re-elected president of the Illinois Canning Co., Hoopeston.



Single Gland Type



Regular Gland Type



Ball Bearing Type

FOR HANDLING

Acids... Solvents... Sludges...

and other troublesome liquids—

USE WALWORTH LUBRICATED PLUG VALVES

When handling acids, condensates, dyes, oils, solvents, solutions, slurries and hundreds of similar "troublesome" liquids, you get better control, more dependable service and lower operating costs with Walworth Lubricated Plug Valves.

These valves have proved their ability to give easy operation . . . fast action . . . tight shut off . . . greater protection against corrosion. Turning is smooth and easy; just a ¼ turn from full-opening to full-closing. Moreover, Walworth Lubricated Plug Valves are tightly sealed against leaks — *whether open or shut.*

Walworth Lubricated Plug Valves are available in sizes ½" to 26" for pressures from 125 to 5,000 psi, and for vacuum requirement. For further information about Walworth's Complete Line of Lubricated Plug Valves, see your Walworth distributor or write for Catalog No. 46L.

WALWORTH

valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

FREE!

SERVICE CAP

Paperlynen Caps are adjustable to any headsize, eliminating inconveniences of shrinkage, assortment of sizes, and time wasted by each employee in selecting his size. Cost less than expense of laundering cloth caps. Light and more comfortable to wear. Distinctive with your special imprint. Millions used annually by nationally known concerns. Just mail coupon below TODAY, and we will send you absolutely FREE, a Patented Adjustable Paperlynen Service Cap.

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Please send absolutely FREE, a Patented Adjustable Paperlynen Cap.

Name_____

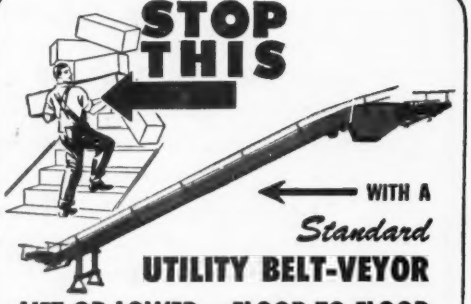
Address_____

City_____ State_____

Name of paper jobber most frequently patronized:

_____

STOP THIS



WITH A *Standard*

UTILITY BELT-VEYOR

LIFT OR LOWER—FLOOR TO FLOOR OR CONVEY HORIZONTALLY

MOVE boxes — cartons — crates — sacks and bundles from basement to first floor, or any floor to floor, or convey in a straight line — continuously with the Standard UTILITY BELT-VEYOR. A compact, pre-engineered unit, easy to install (over existing stairways where practical) handles commodities up to 150 lbs. — available in 4 belt widths — 10, 14, 20 and 24 inch — and equipped with adjustable guard rails to facilitate handling packages wider than belt. Electric motor operated. Write for Bulletin FI-40.

Standard Conveyor Company
North St. Paul
Minnesota

Sales and Service in Principal Cities

Standard
GRAVITY & POWER
CONVEYORS

C. KENNETH SHUMAN, director of Research & Development for Glidden Co.'s Feed Mill Div., Indianapolis, has been selected by the Soya Food Research Council to visit Germany as nutritional adviser to the German Food Administration.

T. T. Sinclair is now vice-president in charge of production, Kingan & Co., Indianapolis.

Paul C. Smith, George J. Stewart, J. F. Brandt, and **W. Harold Brenton** have been elected to the board of directors of Swift & Co.

Herman Strock, Commander, USN, has been assigned as Navy Liason Officer with the Quartermaster Food & Container Institute for the Armed Forces, Chicago.

Leonard J. Vinson has been made director of biochemical research for Lever Bros., Cambridge, Mass. He was formerly biochemist with Armour Research Foundation.

C. B. Weston, general superintendent at Libby, McNeill & Libby's California Fruits Div., has been elected vice-president of the Santa Clara County (Calif) Canners Assn.

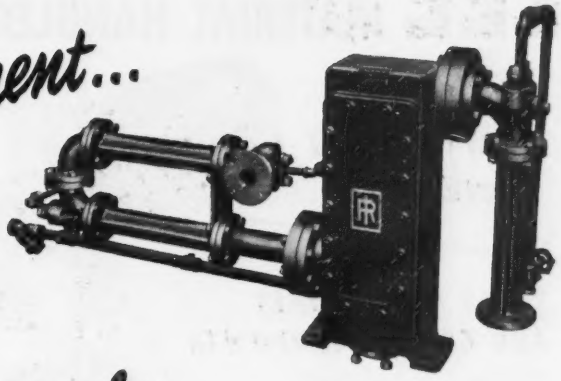
Associated Industry

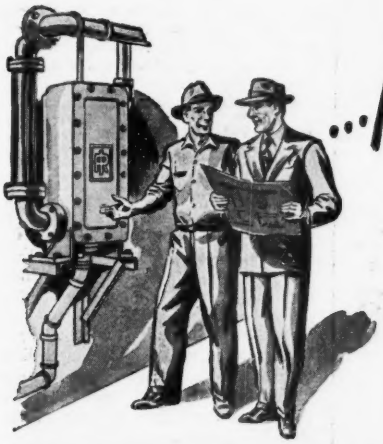
American Can Co. recently began paper milk container production at its new Houston plant.

Cooper Alloy Foundry Co., Hillside, N. J., announces the second of its proposed series of stainless steel valve clinics for April 26 in the Statler Hotel, Buffalo, N. Y.

Graver Tank & Mfg. Co., Inc., East Chicago, Ind., has appointed Harry A. Dennis as sales manager for its Stainless & Alloy Steels Div. He will continue as manager of Weldment sales.

The correct Vacuum Equipment...





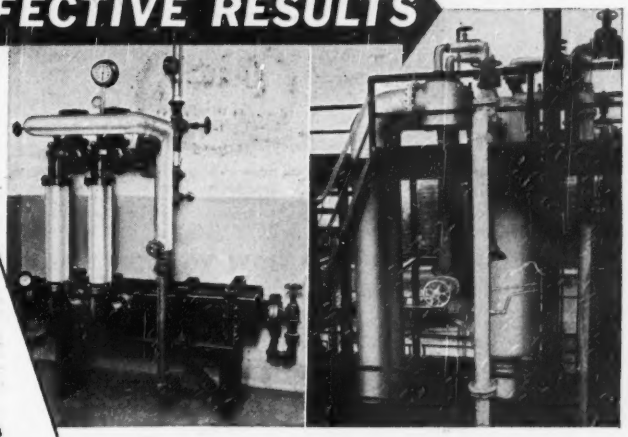
...properly applied by Ingersoll-Rand

To be sure of the most effective results when you're planning on new vacuum equipment, you'll want to know what an Ingersoll-Rand engineer has to say about it. The correct application of ejector equipment can make the difference between an effective installation and one that is costly and inefficient. That's why you will benefit by calling in an Ingersoll-Rand engineer. He will be glad to work with you and give you the advantage of his years of experience with all kinds of vacuum installations.

PRODUCES EFFECTIVE RESULTS

FOR VACUUM EQUIPMENT
Specify I-R

- Steam-jet ejectors
- Reciprocating dry vacuum pumps
- Barometric condensers
- Ejector-jet condensers
- Surface condensers
- Vacuum Refrigeration



Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y.

168-1

LEE MATERIAL HANDLERS

The Industry's Most Important Development

SAVES TIME, MONEY AND COSTLY MANPOWER

LEE Materials Handler dumping 500 lb., 54 gallon barrel of preserves in 4 ft. high kettles. Other models for specific jobs. Write for Bulletin LM-13.

LEE METAL PRODUCTS CO., INC.
416 PINE STREET, PHILIPSBURG, PA.

ALL LEE KETTLES ARE MADE TO A.S.M.E. CODE

NEW!

GET THIS FREE BULLETIN

Analyze your hot water costs!

Pick STEAM INJECTION HEATERS
INSTANTANEOUS

Tear out this page and mail today for the valuable bulletin WH12. It includes a simple cost-check chart which immediately reveals important economies for your own operations.

SEE FOR YOURSELF HOW YOU CAN SAVE UP TO 1/3 OR MORE...and get all this...

- **ANY VOLUME OF HOT WATER INSTANTLY** — No waiting!
- **AUTOMATIC ADJUSTMENT** creates desired temperatures for large or small outputs!
- **SAVE SPACE** — Eliminate storage tanks and related heating facilities!
- **PATENTED INJECTION TUBE** mixes steam and water quietly — no water hammering!

PICK MFG. CO., 340 Alan Avenue, West Bend, Wis.
Without obligation, mail new Bulletin WH-12 to me.

Name.....

Firm.....

Address.....City.....State....

WILLIAM B. OLIVER has been elected executive vice-president of H. W. Lay & Co., Atlanta. He has served as vice-president since he left the Army in 1946.

Hasco Valve & Machine Co., Milwaukee, has named William S. Kennedy sales manager.

A. C. Neilsen Co., marketing research organization, has promoted A. C. Neilsen, Jr., to post of administrative vice-president, and J. P. Napier has been named executive vice-president.

Pneumatic Scale Corp., Ltd., Quincy, Mass., has purchased the entire line of Carter-Vac filling machines, formerly manufactured and sold by the Mechanical Div., General Mills, Inc., Minneapolis.

Deaths

Ernest Byfield, 60, president College Inn Products Co., Chicago—Feb. 10, of a heart ailment.

Rudolph H. Borne, 54, owner of Borne Sauerkraut Co., Syracuse, N. Y.—Feb. 5.

Arthur E. Crowell, 57, former president of Sunshine Biscuit Co.,—in Skowhegan, Me.

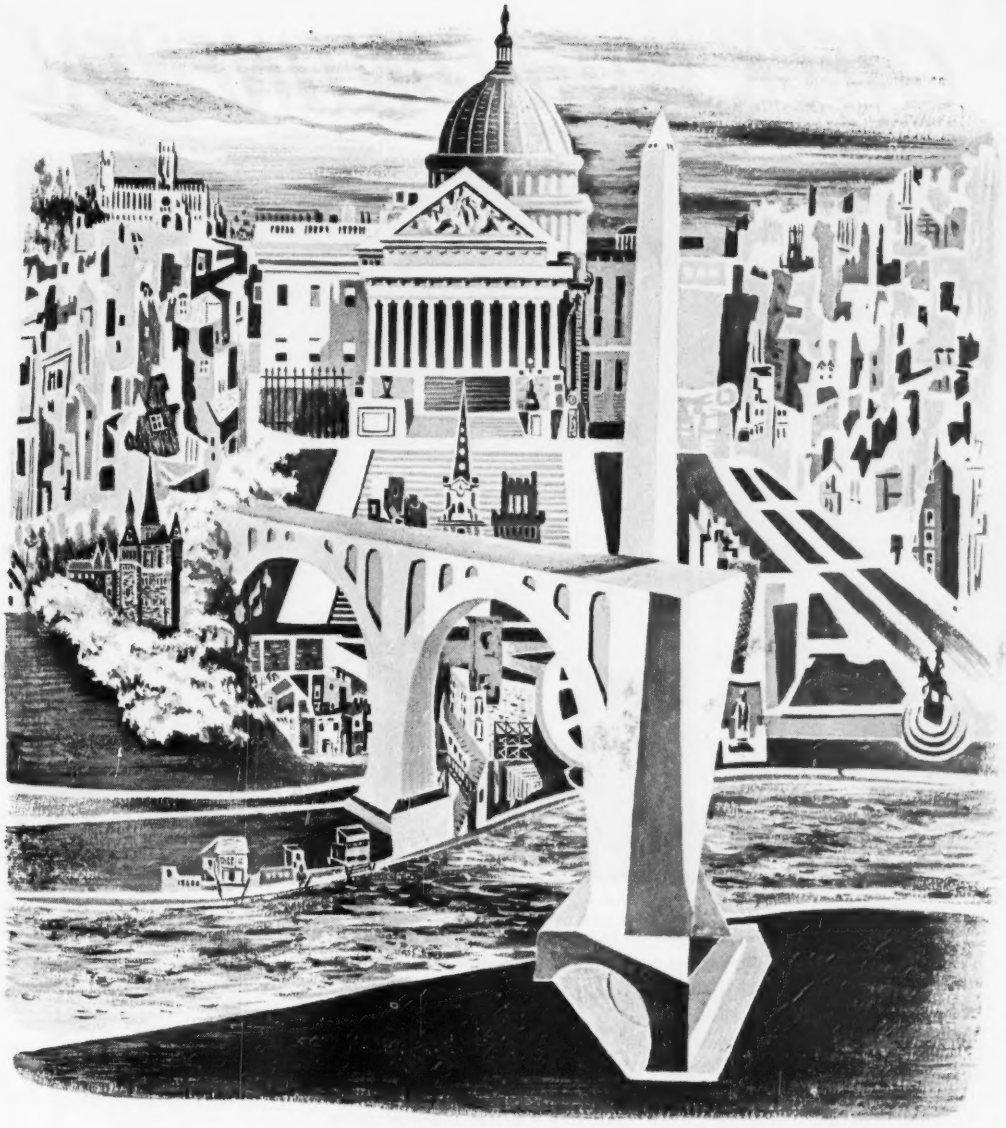
Verne C. McMahill, head of egg and poultry procurement division, Swift & Co.—in January, of a heart ailment.

Percy C. Shirer, 74, for 32 yr. head of the Lane Coca-Cola bottling plant, Kingtree, S. C.—Jan. 30.

J. E. Simmons, 76, veteran candy manufacturer—Feb. 18 in Mexia, Tex., after a long illness.

W. Ormond Young, 82, vice-president of E. M. Tood Co., Inc., Richmond, Va.—Feb. 22, in Richmond.

—End



Artist – James F. Minnicks, native of District of Columbia

DISTRICT OF COLUMBIA – *annual purchases: $980 million – mostly packaged.*

CONTAINER CORPORATION OF AMERICA

Can it be canned?

CHECK WITH CONTINENTAL

Continental has the right package for everything from spice to syrup. Our cans for the food field come in every practical size and shape. And we are ready to sit down with you and talk over your packaging requirements.

Packaging plans call for lithographed labels? Continental's master lithographers take pride in making each can its own point of sale display. Brilliant colors and clear lettering are a big help against competition — particularly in self-service markets.

You will rate Continental service tops too. We have both the research facilities to meet your technical problems and the manufacturing capacity to assure you of a dependable source of supply.

Why not check with Continental today?

You can't beat Continental as a dependable source of supply!

CONTINENTAL CAN COMPANY

100 East 42nd Street New York City 17, N. Y.

Books

Brewing Analysis

METHODS OF ANALYSIS OF THE AMERICAN SOCIETY OF BREWING CHEMISTS, *Fifth Edition. Copies obtained through Mrs. Evelyn Elson, Executive Secretary, Route* 4, *Sturgeon Bay, Wis.* 133 *pages;* 6¾ x 9¾ *in.; paper. Price to members,* $3; *to non-members,* $5.

This book contains the latest recommended standard procedures for all determinations of a commercial nature applying to brewery and malt house materials. There have been many revisions of previously published methods of analyses, and a number of new methods.

The numbering system has been revised—two systems now being given. Consecutive page numbers, appearing at the top of each page, refer to methods listed in the index; while numbers at the bottom of the pages refer to the page number within the method.

Illumination

LIGHTING FOR CANNERIES. *Published by Illuminating Engineering Society,* 51 *Madison Ave., New York* 10, *N. Y.,* 1950. 34 *pages;* 8 x 11 *in.; paper. Price,* 50 *c.*

Recommended lighting conditions through all operations in the food canning process are described and illustrated in this short booklet.

A result of one of the Illuminating Engineering Society's projects, this study had the cooperation of the National Canners Assn., which sponsored a cannery lighting research fellowship at Stanford U. for a period of three years.

In addition to recommendations for lighting actual processing areas, the study describes illumination for offices and laboratories, thus constituting a complete lighting guide for anyone concerned with cannery illumination.

Food Technology

ADVANCES IN FOOD RESEARCH, VOL. II. *Edited by E. M. Mrak and George F. Stewart. Published by Academic Press, Inc.,* 125 *E.* 23 *rd St., New York* 10, *N. Y.,* 1950. 558 *pages;* 6½ x 9¼ *in.; cloth. Price,* $8.80.

As in the first volume, published a year and a half ago, the editors are here attempting to coordinate, integrate and promote the orderly development of scientific knowledge in the general field of food research. Advances in engineering, design and operation of equipment are again stressed. And the areas represented by the contributions are widely diverse.

From the first chapter on the food industry's application of ion exchange to the last on spray drying of foods, the subject matter is covered from every aspect that relates to food technology.

Nine papers have gone into the composition of this second volume. Besides the two already mentioned, there are: "Thermobacteriology as Applied to Food Processing," "The Quaternary Ammonium Compounds and their Uses in the Food Industry," "The Pharmacology of DDT," "Analysis of Foods by Sensory Difference Tests," "The Chemistry of Fruit and Vegetable Flavors," "Histological Changes Induced in Fruits and Vegetables by Processing," and "The Spoilage of Fish and Its Preservation by Chilling."

Pickled Foods

VINEGAR PRODUCTS. *By S. V. Poultney. Published by Chapman & Hall, Ltd.,* 37 *Essex St., W. C.* 2, *London, England,* 1949. 126 *pages;* 5¾ x 8¾ *in.; cloth. Price,* 12/6.

The title of this book may be misleading. It deals in practical fashion not only with the manufacture of vinegars, but also of ketchup, relishes, brined vegetables, fruit sauces, mayonnaise, and most pickle products.

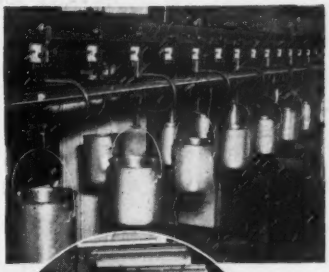
Designed to rectify the scarcity of literature concerning this type of product, the book offers modern British methods and established recipes. It also provides a step-by-step discussion from raw materials to final packaging. The author clings to practice throughout, omitting analysis and scientific control, considered as being in the province of the chemist.

Government Publications

TRADE PRACTICE RULES FOR THE CANDY MANUFACTURING INDUSTRY, *Promulgated January* 24, 1950. *Federal Trade Commission. Unnumbered leaflet.*

WORLD FOOD SITUATION, 1950. *U. S. Department of Agriculture, Foreign Agriculture Circular WFP-*1-50. *Mimeographed.*

A SPRAYER FOR DISPENSING SMALL MEASURED QUANTITIES OF LIQUID. *By Orin A. Hills, et al. Bureau of Entomology, ET-*280. *Mimeographed.*



increase production in the same floor space with

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OVERHEAD CABLE CONVEYORS

● If expensive expansion seems to be the only answer to the increased production you want . . . check BUSCHMAN Trolley Conveyors first! Stock units give you a custom-made installation at ready-made prices, with no disruption of production or present facilities. Requires no welding for ceiling or floor mounting.

Let a Buschman Engineer survey your plant . . . show you without cost or obligation . . . how Universal Cable Trolley Conveyor can "add" floor space. Write for further details.

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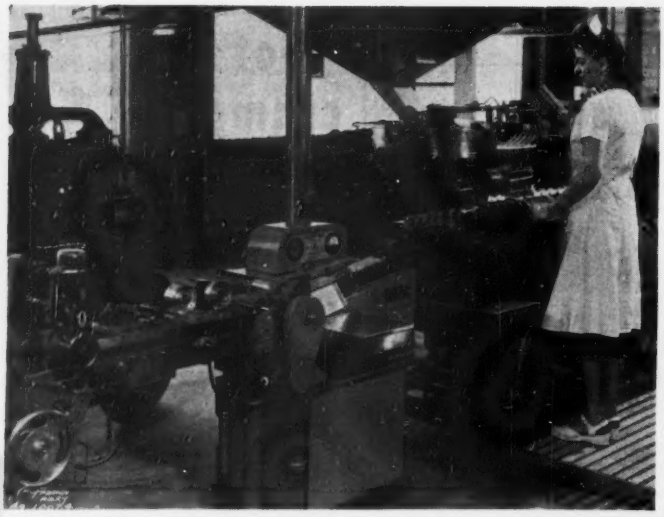

Selectrol — an Automatic Checkweigher for Volume Packaging Operations . .

SELECTROL is an automatic checkweigher separating packaged products into three classifications . . . underweight, EXACT WEIGHT and overweight. This new unit solves "Mis-packaging" by eliminating troublesome underweight cartons as well as overweight containers which threaten profitable operation . . . completely removes the human element . . . cuts per unit packaging costs to the lowest level ever attained.

A number of models are available, some of which are designed to checkweigh ahead of top closing or sealing equipment. Overweight packages are deflected to the left and trimmed of excess product. Underweight packages are deflected to the right and product is added. EXACT WEIGHT containers continue straight ahead for finished wrapping and sealing.

These new SELECTROLS are the newest electronic means of classification . . . are fully automatic . . . highly accurate . . . will operate at speeds up to 120 packages per minute in capacities of from 2 oz. to 2 lbs. For complete details write the Electronic Equipment Division at the address below.

Service by nation's foremost electronic service specialists!

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Nationwide service through the RCA Service Company, Inc.,* is yours when you buy the SELECTROL. The electronic experts of this specialized service organization supervise the initial setup and adjustment, also supply whatever subsequent service you need.

*Electronic servicing subsidiary Radio Corporation of America

EXACT WEIGHT SCALES

Industrial Precision

THE EXACT WEIGHT SCALE COMPANY

21 W. Fifth Ave., Columbus 8, Ohio

2920 Bloor St., W., Toronto 18, Canada

THE EFFECT OF PASTEURIZATION ON SOME CONSTITUENTS AND PROPERTIES OF GOAT'S MILK. *By H. S. Haller, et al. U. S. Department of Agriculture, Technical Bulletin* 800.

GRADING DRESSED TURKEYS. *Production & Marketing Administration, Farmers' Bulletin F*1815, *rev. Price* 10c.

KNOW YOUR BUTTER GRADES. *Production & Marketing administration, Folder L* 264. *Price* 5c.

DETERIORATION OF EGG QUALITY DURING MARKETING. *Production & Marketing Administration, PA* 79.

MILK PRODUCTION ON FARMS AND STATISTICS OF DAIRY PLANT PRODUCTS, 1949. *Bureau of Agricultural Economics. Mimeographed.* A detailed statistical report by States.

RETAILING PREPACKAGED MEATS. *By A. T. Edinger, et al. Production & Marketing Administration. Mimeographed. A report of a field survey.*

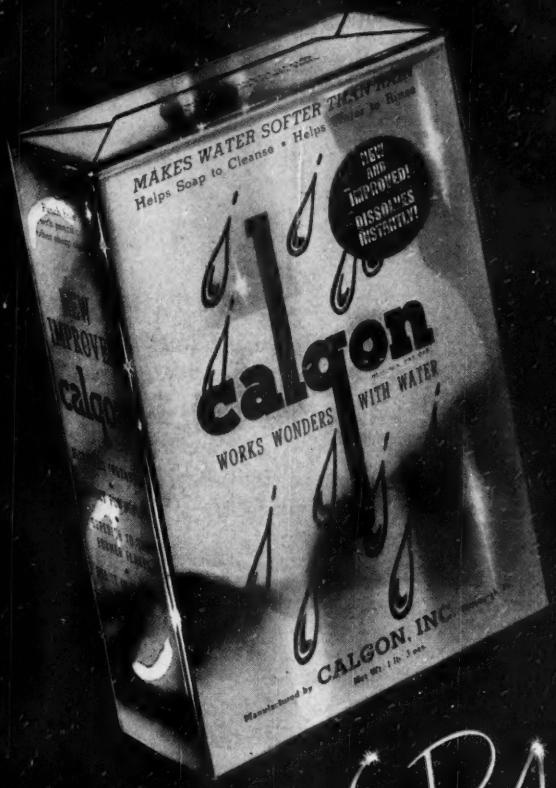
Selling to the Government is the subject of two booklets intended to guide those in industry wishing to supply goods for federal use. Issued by the military departments, they are: SELLING TO THE NAVY. *NAVEXOS P-548. Price* 15c.; and HOW TO SELL TO THE UNITED STATES ARMY. *Price* 30c.

These recently issued documents are available, at the prices indicated, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. When no price is indicated, the pamphlet is free and should be ordered from the Bureau responsible for its issue.

PRICE SPREADS BETWEEN FARMERS AND CONSUMERS. *By Richard O. Been. Bureau of Agricultural Economics, Agricultural Information Bulletin No. 4. Mimeographed.*

UTILIZATION OF FARM CROPS—PRICE SPREADS. *A record of the Hearings before a Subcommittee of the Senate Committee on Agriculture relative to expanded uses of farm crops.* Gives extensive record of testimony on the mark-up between raw material and consumer prices.

METHODS OF MICROBIOLOGICAL AND CHEMICAL DETERMINATIONS OF ESSENTIAL AMINO ACIDS IN PROTEINS AND FOODS. *By D. B. Jones, et al. U. S. Department of Agriculture, Miscellaneous Publication* 696. —*End*



This sparkling aluminum foil package attracts attention, provides protection for Calgon, a highly hygroscopic product.

Formerly, moisture absorption caused caking, made this excellent water softener difficult to use. Now, packages using Alcoa Foil as a moisture barrier keep the product free from excess moisture, in a form that helps create repeat sales.

If gain or loss of air or moisture affects the quality, taste or appearance of your product, Alcoa Foil Packages can provide protection and sales appeal.

Let us furnish you the names of leading package manufacturers experienced in designing packages using Alcoa Foil. Just write ALUMINUM COMPANY OF AMERICA, 1 [illegible] Pittsburgh 19, Pa.

you get

SPARKLE plus

an effective moisture barrier

Test boxes, taken from the production line weighed 1000 grams when placed in humidity chamber (100° F and 100% rel. humidity) - average weight after 10 days - 1007 grams.

with packages of

ALCOA

ALUMINUM FOIL

FORT PITT
QUALITY MEAT PRODUCTS

VARIED FOOD-PROCESSING APPLICATIONS AT

FRIED & REINEMAN PACKING COMPANY

EMPHASIZE THE VERSATILITY OF *GAS*

Gas-fired Advance revolving tray oven used for baking meat.

Loading the racks in one Gas-fired revolving wiener smokehouse.

Checking picnic hams during curing process in multi-story smokehouses. Lipton smoke unit and heater are Gas-fired.

QUALITY COOKING is not the usual way to describe heat-processing in the meat packing industry. But, Fried & Reineman Packing Company controls its cooking operations just as carefully as the expert homemaker or master chef.

Under its **FORT PITT** trademark, this fifty-three year old Pittsburgh packer markets more than seventy varieties of sausages and loaf-meats, as well as bacon, ham, and other products. Most of these meat products are smoked, cooked, or baked under quality controlled standards in modern ovens and smokehouses using GAS both for cooking and for smoke-generating.

In commenting on the wide use of GAS in the Fried & Reineman plant, the management emphasized, **"Accurate temperatures, automatically maintained, are essential to our processing. In baking, we use the slow-heat method to hold the juices and flavor in the meat. Smoking, too, requires a variety of temperatures for our wide range of products and, in all our smokehouses, GAS gives us the precise control for every need."**

Throughout the packing industry GAS performs countless heat-processing functions on a production-line basis. In fact, the versatility of GAS and the flexibility of Gas Equipment have been demonstrated throughout the food industry, wherever heat is used for processing. From an economy standpoint alone, you should investigate GAS today—Your Gas Company Representative is always ready to help.

MORE AND MORE...
THE TREND IS TO GAS
FOR ALL HEAT PROCESSING OF FOODS

AMERICAN GAS ASSOCIATION
420 LEXINGTON AVENUE, NEW YORK 17, NEW YORK

Catalogs, Bulletins

Food Plant Equipment

Power Distribution A

Construction details, accessories, engineering data, and application information for LVD and SAC Flex-A-Power heavy duty power distributors are presented in 40-page Catalog TEB-1.—*The Trumbull Electric Mfg. Co., Plainville, Conn.*

Dust Control B

Photos, drawings, capacity ratings, and dimensions of "Autoclean" dust filters are featured in 8-page Bulletin 491.—*The Day Co., 810 Third Ave., Minneapolis 13, Minn.*

Refrigerating Equipment C

Checklist of typical cooling machinery and apparatus for use in commercial and industrial sizes is featured with illustrations, in new 8-page Bulletin 195-A.—*Frick Co., Waynesboro, Pa.*

How To Select Generators D

Main points to look for when ordering generators is told non-technically in new 8-page Bulletin 2200-PRD-196. *Your Guide to Profitable Installations of Modern Generators* is title of publication.—*Electric Machinery Mfg. Co., Minneapolis 13, Minn.*

Condensers, Coolers, Ejectors E

Design, construction and packings of condensers and their auxiliaries, together with pages of condenser-tube data, pressure-temperature conversion tables, and a graph of heat-transfer curves, are presented in Bulletin 441-C. Titled *Coolers Type "AL"*, publication describes heat exchanger design most widely used for liquid-to-liquid heat transfer where working pressures and temperature ranges are moderate. In second bulletin, *Steam Jet Air Ejectors*, is given principle of operation, the classification of ejectors and auxiliaries, and engineering data for this equipment.—*Condenser Service & Engineering Co., Inc., Seaboard Trust Bldg., Hoboken, N. J.*

High-Vacuum Pumps F

Engineering information, specifications, and other data about operation of pumps and their principles for producing high vacuum in a multitude of applications, are clearly displayed in a 34-page Catalog 700.—*F. J. Stokes Machine Co., Philadelphia 20.*

Centrifugal Pump Handbook G

Revised handbook on care of centrifugal pump gives how and why of equipment construction and considers pump maintenance. Designation is Bulletin 08X6256A.—*Allis-Chalmers Mfg. Co., 1126 S. 70th St., Milwaukee, Wis.*

Electric Power Drives H

Variable speed, normal speed, and geared type electric motors are illustrated and their features highlighted in an 8-page pamphlet.—*Sterling Electric Motors, New York 51, N. Y.*

Pressure Leaf Filters I

Construction, design, operation and application of pressure leaf filters are highlighted in 16-page bulletin.—*Niagara Filter Corp., 2998 Main St., Buffalo, N. Y.*

Steel Tubing J

Bulletin TA 1517 concerns stainless steel tubes and pipes suitable for conveying lines and heat transfer units for processing milk, cheese, ice cream, soup, soft drinks, fruit, vegetables, beer, and ale.—*Babcock & Wilcox Tube Co., Beaver Falls, Pa.*

Flotation K

Waste materials from canneries, meat packing plants, dairies, and other types of food processing plants, can often be recovered profitably by means of flotation. Twenty-page Bulletin F10-B29 tells how.—*Denver Equipment Co., 1400 17 St., Denver 17.*

Generators L

Seven new bulletins (Series ID-49, Nos. 37 through 43) contain performance data on gas-, oil-, and combination firing Steam-Pak generators—*York-Shipley, Inc., 261 Jessop Place, York, Pa.*

Speed Reducers M

Horizontal, worm-gear speed reducers are fully described in 28-page Catalog G-WB. Included are horsepower rating tables, overhung load ratings, and dimension tables for worm gears.—*De Laval Steam Turbine Co., Trenton 2, N. J.*

Ice Making Plants N

Operating costs and specifications of factory-assembled ice plants, with capacities from 250 lb. to 6 tons daily, are contained in 8-page Catalog 30700.—*Reco Products Div., Refrigeration Eng. Corp., 2020 Naudin St., Philadelphia 46.*

Evaporators O

Complete description of line of evaporators is contained in 72-page Catalog 351.—*Buffovak Equipment Div., Blaw-Knox Co., 1543 Fillmore Ave., Buffalo 11, N. Y.*

Bottle Washers P

New features of 8- and 12-bottle-wide models of Soaker-Hydro bottle washers are revealed in 10-page Bulletin 829.—*Rice & Adams Corp., Buffalo, N. Y.*

Sewage Pump Q

Specially designed for sewage and trash disposal is new bladeless impeller pump detailed in 16-page Bulletin 5400K-1.—*Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5.*

Meat Packing Equipment R

Contained in 100-page Catalog 49 are specifications and descriptions of a complete line of meat packing equipment.—*LeFiell Bros. Co., 1469 Fairfax Ave., San Francisco 24.*

Mixers S

Capacities ranging from ¾- to 2,000-gal. are specified for mixers described in 8-page general catalog.—*Patterson Foundry & Machine Co., East Liverpool, Ohio.*

Centrifuges T

New line of centrifuges featuring external control of solids discharge and solids consistency is given in Bulletin 1243.—*The Sharples Corp., Westmoreland St., Philadelphia 40.*

Packaging Units U

Twelve new-model packaging machines are illustrated in 6-page bulletin.—*Package Machinery Co., Springfield 7, Mass.*

Hot Water Heaters V

Wherever there is a demand for a continuous supply of hot water, and the steam sup-

"Our best ads are installed . . ."

Continuous stave redwood pipe and fittings

COOLING TOWERS
WOOD TANKS
STAINLESS TANKS
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MULTI-FIN UNITS

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Send us a sample OF ANY STOCK YOU WANT TO PULVERIZE

We'll make a test grind with

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You will receive our Engineering Report suggesting the best method to use and the type of Schutz-O'Neill Pulverizer and any receiving or sifting equipment suited to your requirements.

SCHUTZ-O'NEILL offers you the benefit of more than a half century of experience in rapid, accurate, dustless pulverizing of any dry, grindable, non-gritty stock.

SCHUTZ-O'NEILL Pulverizers are made in 6 sizes with capacities up to 2000 lbs. per hr. Also Gyrator Sifters, Roller Mills, Receiver Boxes, Collectors, Hammermills, etc.

When sending sample, be sure to state fineness desired.

ESTABLISHED 1893 SCHUTZ-O'NEILL CO.
309 PORTLAND AVE. SOUTH
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MATERIAL HANDLING NEWS

IT'S NEW!
It's Different!
It Tows Ten Tons!

The CLARKETTE-5

As light and tough as a bantamweight champion.
Ideal towing tractor for order selection and similar warehouse operations requiring frequent starts and stops for loading and unloading small individual items.

NOTE THESE REVOLUTIONARY FEATURES:

- Getting on and off is as easy as taking a normal step—because the driver stands.
- A rod extending across the machine above the cowl is a combination clutch and throttle control. This permits safe and easy operation whether driver is on the machine, or walking beside it—on either side—while it travels and tows.
- Tested, refined and proved in almost a year of actual use in order-selection work. Eminently practical, simple and economical. Users will find it "a natural" for doing many daily chores now performed by less efficient and more expensive means.
- Complete facts and figures are presented in new literature which is yours for the asking.

A good idea! MAIL THIS HANDY COUPON ...TODAY

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS AND INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIVISION • CLARK EQUIPMENT COMPANY • BATTLE CREEK 14, MICH.

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AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

ply is constant, there may be used the instantaneous hot water heaters reviewed in 36-page Catalog 202.—*Patterson-Kelley Co., Inc., East Stroudsburg, Pa.*

Vibrating Process Equipment A

Principles and vibrating data on electrical dryers, coolers, packaging tables, conveyors, and auxiliary equipment are offered in 52-page Catalog 804—*Jeffrey Mfg. Co., Columbus 16, Ohio.*

Steam Boilers B

Advantages of self-contained, oil and gas fired steam boilers for processing and heating are outlined in 12-page catalog. Sizes ranging from 15 to 500 hp. and 15 to 200 psi. are illustrated.—*Cleaver-Brooks Co., 326 E. Keefe Ave., Milwaukee 12.*

Multi-Process Tanks C

Stainless steel tanks, for use where pasteurizing, heating or cooling temperatures are required, are shown in 10-page Bulletin B-225. In addition, the principles of hot water heating, steam heating, and cooling are outlined.—*The Creamery Package Mfg. Co., 1243 W. Washington Blvd., Chicago 7.*

Materials Handling

Portable Elevator Table D

Covered in 4-page Bulletin P-50 is portable elevating table designed for lifting and transporting heavy tools or materials.—*Hamilton Tool Co., 9th & Hanover Sts., Hamilton, Ohio.*

Palletless Handling E

A system of fork truck loading with a smooth steel pallet is described in 4-page bulletin.—*Yale & Towne Mfg. Co., Roosevelt Blvd. & Haldeman Ave., Philadelphia 15.*

Tube Filling F

New 20-page Bulletin 510 presents complete report on line of tube fillers, and on closing and sealing equipment for handling liquids, semi-liquids, and heavy pastes.—*F. J. Stokes Machine Co., Philadelphia.*

Sectional Conveyor G

Illustrated description of recently introduced sectional conveyor is contained in 4-page Bulletin 132.—*Robins Conveyors Div., Hewitt-Robins, Inc., Passaic, N. J.*

Materials Handling H

Complete line of materials handling equipment is reported in 32-page Catalog 825.—*Jeffrey Mfg. Co., Columbus 16, Ohio.*

Vibratory Equipment I

Presented in 128-page Catalog 501 are specifications and operating data on entire line of vibratory materials handling equipment.—*Syntron Co., Homer City, Pa.*

Conveyor-Track Tunnel J

Foods are frozen in tunnels 40- to 60-ft. long by blowing very cold air across with a series of fans. System is set forth in 4-page Bulletin 148-D.—*Frick Co., Waynesboro, Pa.*

Uncaser and Washer-Loader K

Cartons and cases containing empty bottles are automatically unloaded and then reloaded after bottles have been washed. Machine can operate at speeds up to 500 bottles per minute. Sketch and operating details are shown in 4-page bulletin.—*Beverage Machinery Section, Radio Corp. of America, Camden, N. J.*

Filling Machines L

Semi- and fully automatic filling machines for powdered and granular products are pre-

The New **JENKINS** PLUG TYPE **ARMOR SEAT VALVE**

TAMES THE TOUGHEST VALVE SERVICES IN INDUSTRY

SETTING RECORDS FOR LONG LIFE AND LOW MAINTENANCE

For Severe Services like . . . **PRESSURE REGULATION • STEAM CONTROL • BY-PASS LINES • TEMPERATURE REGULATION APPARATUS THROTTLING • BLEEDS, DRIPS, DRAINS • SOOT BLOWERS • CONTINUOUS BOILER BLOWDOWNS • OPEN BLOWS ON BOILERS • ANY CLOSE REGULATION OF STEAM**

In Many Industries like... **DYE WORKS • BLEACHERIES • BREWERIES • OIL REFINERIES • CREOSOTING PLANTS • PACKING HOUSES • MILK PLANTS • PLASTIC MOLDING PLANTS • HAT FACTORIES • GAS WORKS • TANNERIES • SUGAR REFINERS • BOILER PLANTS • RUBBER MILLS**

Do YOUR piping systems include valve-killing services that build up excessive maintenance and replacement costs? If so, the new Jenkins Fig. 976-A Plug Type Bronze Globe Valve will produce important savings for you.

Install it where "wire drawing", due to close control of steam, knocks out other valves quickly—where entrapped chips, rust, or scale score the seats and start leaks. See how it defeats the worst valve enemies . . . how it sets new records for endurance and economy.

HERE'S WHY

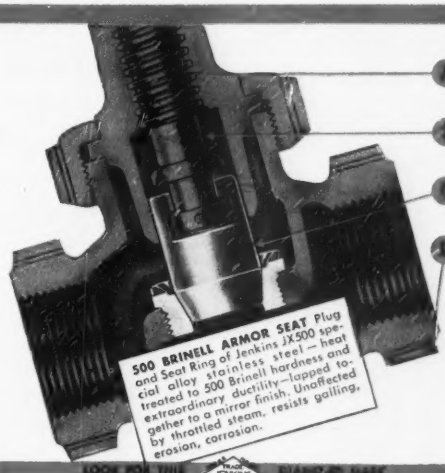
The stout "heart" of the Fig. 976-A is the stainless steel plug and seat ring, *hard enough* (500 Brinell) to smash steel pipe chips without scoring, yet *tough enough* to take a nine ton load without cracking. Other features are . . .

A MORE THREADS, LESS WEAR—Additional threads in bonnet and on spindle assure full thread engagement (open or closed), less load, less wear per thread.

B NEW "TUFFARD" SPINDLE—Aluminum bronze (tensile strength exceeds 65,000 lbs.)—tough to take stresses, yet hard for long wear. Bigger in diameter, with more strong threads.

C NEW SLIP-ON, STAY-ON PLUG—Simple design with T-slot for engaging spindle head is stronger, trouble-free, and permits free flow. Mirror-finished bevel assures perfect mating with seat ring.

D NEW STURDY LUGS—Flat-faced, V-shaped lugs on union bonnet ring and body ends, permit firm fit and grip of open end, pipe or monkey wrench—withstand repeated disassembly.



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sented in 4-page bulletin.—*Stokes & Smith Co., 4900 Summerdale Ave., Philadelphia 24.*

Control Equipment

Leak Detection A

Methods of detecting leaks and specific applications in both vacuum and pressure systems, plus full description of a leak detector, are contained in 16-page catalog.—*Consolidated Eng. Corp., 620 N. Lake Ave., Pasadena 4, Calif.*

Chlorine Dispenser B

Operational data and design features of chlorine dispensers used in dry vacuum system are outlined in 12-page Catalog 61.—*Fischer & Porter Co., Hatboro, Pa.*

Filter Facts C

An enclosed type, horizontal plate, pressure filter, complete with hydraulic closing pump, is highlighted in Bulletin 133. Maker states equipment is easy to clean, has high flow rates, no leakage, no evaporation, and does not become contaminated. It filters from inside cartridge into tank, which is not under pressure. In Bulletin 132, filter media, including cotton, wool, synthetics, glass, paper, asbestos, and metal, are described.—*T. Shriver & Co., Inc., 810 Hamilton St., Harrison, N. J.*

Flame Control D

Explanatory 4-page bulletin F2-1 tells about combustion safeguard for oil and gas fired heating equipment. — *Wheelco Instruments Co., Chicago 7.*

Capillary Tubes E

A guide to application of capillary tubes on Freon-12 hermetic condensing systems is latest *Application Data Section* issued by *American Society of Refrigerating Engineers, 40 W. 40 St., New York.*

Moisture Control F

Catalog R-8 shows dimension, ratings, and parts of line of DFN refrigeration dryers, filters, strainers, moisture indicators, and moisture control units. —*McIntire Connector Co., 268 Jefferson St., Newark 5, N. J.*

Plant Supplies

Oils and Flavors G

New price list of essential oils, balsams, oleoresins, concentrated flavors, and basic perfume materials offered in 48-page catalog.—*Magnus, Mabee & Reynard, Inc., 16 Desbrosses St., New York 13.*

Aluminum Paint H

Six different aluminum paints are described in 4-page folder. *Skybryte Co., 3125 Perkins Ave., Cleveland 14.*

Transparent Films I

A chart which presents complete data on comparative characteristics of commonly used transparent films is feature of 18-page booklet, *Adhesives for Transparent Films.—National Adhesives Div., National Starch Products Inc., 270 Madison Ave., New York 16.*

Plastic Tubing J

Uses, properties, and chemical resistant characteristics for all formulations of Tygon plastic tubing are tabulated in 24-page Bulletin T-77.—*U. S. Stoneware Co., P. O. Box 350, Akron 9, Ohio.*

Protective Coatings K

Specifications and applications of protective

"Vanilla, Chocolate, Strawberry?"

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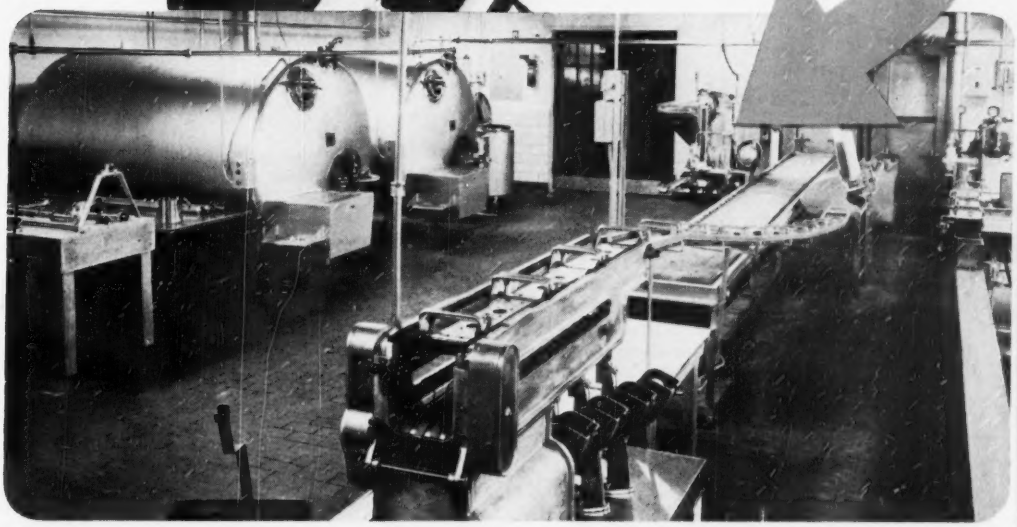

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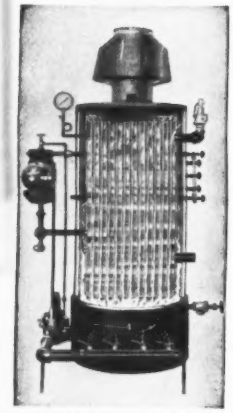

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coatings for concrete, metal, or wood surfaces are covered in 8-page Bulletin 7-1.—*Atlas Mineral Products Co., Mertztown, Pa.*

Dust Collectors **A**

Detailed information on new line of dust collectors, including a nomograph for determining number of tubes for given capacity, is provided in 16-page Catalog 250S.—*Prat-Daniel Corp., East Port Chester, Conn.*

Miscellaneous

Demineralizers **B**

Included in new 20-page Catalog 123 is a section on differences between distilled and demineralized water. A complete line of demineralizers is illustrated.—*Barnstead Still & Sterilizer Co., 113 Lanesville Terrace, Boston 31.*

Movies **C**

Sound motion pictures and slide films for educational and entertainment programs in the plant are described in 46-page Booklet B-4273.—*Westinghouse Electric Corp., Box 868, Pittsburgh 30.*

Counting Devices **D**

Heavy duty counters, for use where dependable, accurate counting and recording of unit production is vital, are illustrated in 6-page Bulletin 3149.—*Richardson Scale Co., Clifton, N. J.*

Vinyl Butyral Resins **E**

Development of "wash primer" type of metal conditioner is featured in 24-page booklet *Vinylite*, which concerns use of vinyl butyral resins in formation of protective coatings.—*Bakelite Corp., 300 Madison Ave., New York 17.*

Premium Promotion **F**

Designed for smaller companies, several premium plans are outlined in 4-page folder. Description tells why, when, and how to use them.—*Moore Enameling & Mfg. Co., West Lafayette, Ohio.*

Hydrogen Peroxide **G**

Reactions, physical data, and properties of hydrogen peroxide solutions of 27.5, 35, and 50 percent are reported in a new booklet.—*Buffalo Electro-Chemical Co., Station B, Buffalo 7, N. Y.*

One-Way Bottles **H**

Latest cost information on one-way glass bottles is included in 12-page Questions and Answers booklet.—*Owens-Illinois Glass Co., Toledo 1, Ohio.*

Safety Equipment **I**

Everything in Safety is new 46-page publication on respiratory devices, eye protection, hats, gloves, carboy pumps, drum pumps, and other industrial safety equipment.—*General Scientific Equipment Co., 2700 W. Huntingdon St., Philadelphia 32.*

Hydrogen Zeolites **J**

Brochure of 12 pages, *Operating Experiences With Resin Zeolites on the Hydrogen Cycle*, concerns water-softening process using acid regeneration. — *Graver Water Conditioning Co., 216 W. 14 St., New York 11.*

Self-Lubricating Packings **K**

Text in 4-page Bulletin LP-10 covers principles of self-lubricating design, structure, and performance of packings, as well as analyses for application to specific purposes.—*Greene, Tweed & Co., North Wales, Pa.*

—*End*

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Bulletin 18-RA, shown at left, pictures and briefly describes the construction and principle applications of all standard SK Rotameters. It's yours for the asking.

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Patents

Fish Egg Proteins Obtained by Crushing Salmon Eggs, Separating Egg Shell Membranes and Unchemically Bound Fats, and Dissolving Proteins in Salt Solution of 0.09 to 1.5 Molar Concentration—*R. J. Block, Scarsdale, N. Y., H. N. Brocklesby* and *N. I. Rogers, Waterloo, Iowa, to Borden Co., New York City.* No. 2,492,518. Dec. 27, 1949.

Dry Milled Proteinaceous Starch Flour Converted Into Substantially Water-free Product but Capable of Being Water-Dispersed and of Yielding Homogeneous Water Dispersion by Treatment with Glacial Acetic Acid and Heating Mixture to 100 to 118 Deg. C.—*G. V. Caesar, Staten Island, N. Y., to Stein Hall & Co., Inc., New York City.* No. 2,492,552. Dec. 27, 1949.

Starch-Containing Flour Heated With Single Phase Solution of Acid Consisting of Glacial Acetic Acid in Non-Aqueous Inert Solvent at Reflux Temperature Until Starch Has Fixed Acetic Acid Content in Range of From About 1 to About 8 Percent by Weight—*G. V. Caesar, New York City, to Stein Hall & Co., Inc., New York City.* No. 2,492,553. Dec. 27, 1949.

Enzyme Solution Whipped Into Foam Under Reduced Pressure and Dried at Temperature Below its Coagulable Point to Make Enzyme Reagent—*F. L. Kauffman, Chicago,* and *W. M. Urbain, Western Springs, Ill., to Swift & Co., Chicago.* No. 2,492,580. Dec. 27, 1949.

Mixing Properties of Dough Improved and Kneading Time Reduced by Incorporation of Unsubstituted Alkyl Sulphur Derivative With Molecular Weight in Excess of 145—*E. G. Marhofer, Bartlesville, Okla., to Phillips Petroleum Co.* No. 2,492,588. Dec. 27, 1949.

Milk and Similar Viscous Liquid Flowing in Continuous Stream Into Closed Chamber of Small Capacity Heat-Treated by Injection of Plurality of Steam Streams While Agitated With High-Speed Blade With Removal of Heated Liquid From Chamber Under Conditions to Maintain Pressure in Chamber Slightly in Excess of Steam Pressure—*L. R. Hawk to Golden State Co., Ltd., San Francisco.* No. 2,492,635. Dec. 27, 1949.

Citric Acid Produced by Submerged Fermentation of Nutrient Carbohydrate-Containing Solution in Which Cellular Morphology of *A. niger* Strain is Controlled During Fermentation—*R. L. Snell* and *L. B. Schweiger to Miles Laboratories, Inc., Elkhart, Ind.* No. 2,492,667. Dec. 27, 1949.

Fats, Flavoring Ingredients and Fibrous Material in Cellular Substances Separated by Heating to Make Fats Plastic but not Liquid and Applying Pressure to Force Plastic Fats and Flavoring Materials to Longitudinal Side Edges of Layer or Blanket of Fiber Constituents—*M. J. Stacom, New York City.* No. 2,492,668. Dec. 27, 1949.

Molasses Diluted in 3 to 1 Ratio and Decationized in Two Steps Preliminary to Use in Citric Acid Fermentation—*J. C. Woodward* and *R. L. Snell, Elkhart, Ind.,* and *R. S. Nicholls, Ogmore-by-Sea, Wales, to Miles Laboratories, Inc., Elkhart.* No. 2,492,673. Dec. 27, 1949.

Cheese Pressed for Removal of Whey by Progressive Three-Step Method Without Removing Forms From Press During Transfer to Each Successive Stage—*R. Miollis, Maywood, Ill.* No. 2,492,878. Dec. 27, 1949.

Fresh Peas Dehydrated by Subjection to High Vacuum While Frozen—*E. W. Flosdorf, Forest Grove, Pa., to Lyophile-Cryochem Corp., Baltimore.* No. 2,493,062. Jan. 3, 1950.

Sausage Casing Closed by Pleating Collapsed End, Applying Barrel Fastener and Crimping Fastener Into Firm Sealing Contract With Casing—*J. J. Frank, Union,* and *J. C. Macy, Elizabeth, N. J., to Hercules Fasteners, Inc.* No. 2,493,063. Jan. 3, 1950.

Food Composition Made by Adding Fat Solvent to Substantially Dry Food Composition and Subsequently Removing Fat Solvent by Volatilization—*S. Musher to Musher Foundation, New York.* No. 2,493,080. Jan. 3, 1950.

Fruit Mixed in Portable Tank Consisting of Vertical Cylindrical Section and Diagonal Lower Cylindrical Section Fitted With Rotatable Shaft Carrying Paddle—*R. Kennedy, Jr., Drexel, Pa., to Abbotts Dairies, Inc., Philadelphia.* No. 2,493,249. Jan. 3, 1950.

Riboflavin Prepared by Cultivating *Eremothecium ashbyii* in Liquid Culture Medium Containing Assimilable Carbon, Phosphorus, Sulphur, Zinc, Potassium and Nitrogen in Form of Ammonium Nitrogen at pH of About 4.0 to 7.5—*B. Tabenkin, to Hoffman-LaRoche Inc., Nutley, N. J.* No. 2,493,274. Jan. 3, 1950.

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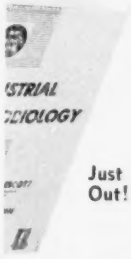

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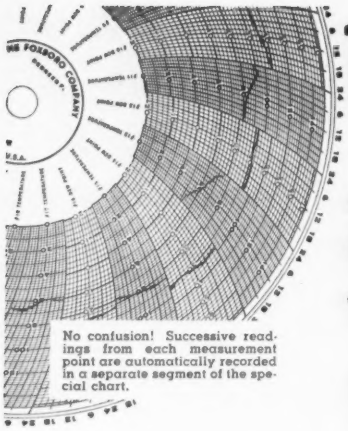

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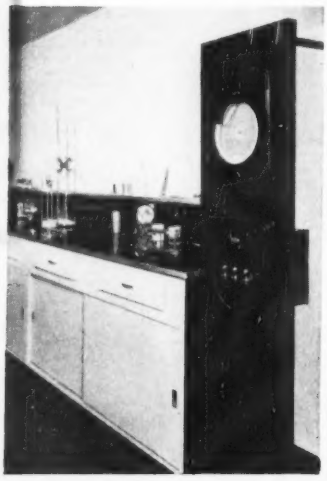

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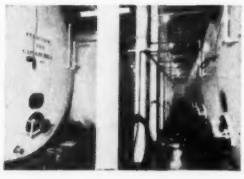
Left, installation of Segmental-Chart Dynalog in laboratory at Maier Brewing Co., Los Angeles, Cal.

Below, the fermenting tanks in which temperatures are being measured.



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Frozen Confection Mix Made to Contain Edible Hydrophilic Stabilizing Colloid and Polyoxyethylene Ester of Stearic Acid.—*A. B. Steiner and A. Miller, La Jolla, Calif., to Kelco Co., San Diego.* No. 2,493,324. Jan. 3, 1950.

Pork Fat-Containing Stock Cooked in Vertical Tank in Presence of Steam, Permitted to Settle Into Strata Preliminary to Withdrawing Tank Water to Lower Lard Level to Draw-Off Point Above Bottom of Stratified Stock; Tankage, Remaining Tank Water and Floaters Subsequently Removed From Bottom of Tank—*R. Koppit and C. J. Davis, Jr., to Armour and Company, Chicago.* No. 2,493,459. Jan. 3, 1950.

Fruits and Other Agricultural Products Freed of Spray Residues by Washing in Solution of Hydrocarbon Oil Solvent for Fruit Wax, Alkyl Aryl Sulfonate Wetting Agent and Alkaline Agent Soap—*R. H. Larson, San Francisco, and F. Bresee, Jr., San Mateo, Calif., to Fred Bresee Jr.* No. 2,493,460. Jan. 3, 1950.

Foods Grated by Manually Operated Rotary Drum—*R. McCoy, New York City.* No. 2,493,496. Jan. 3, 1950.

Tuna Fish Prepared for Further Processing by Precooking in Steam With Juices and Condensates Extracted From Fish Sprayed Over and Around Fish During Cooking Until Temperature of About 160-170 Deg. F. is Reached, Followed by Cooling to 35-60 Deg. F. in Presence of Moisture Laden Atmosphere Having Relative Humidity From 75 to 99 Percent—*O. W. Lang, San Carlos, Calif.* No. 2,493,586. Jan. 3, 1950.

Kernels of Green Corn Cut From Cob by Manually Operated Rotary Device of Tongs-Like Design—*G. J. Martin, Short Hills, N. J.* No. 2,493,588. Jan. 3, 1950.

Bottled Milk and Cream Heat-Treated to Pasteurizing Temperature, Subsequently Cooled During Step-by-Step Progression Into and Through Plurality of Separate Water Baths—*J. O. Fowler, Sparkhill, Birmingham, England.* Nos. 2,493,663 and 2,493,664. Jan. 3, 1950.

Meat Pieces Skinned by Loosening Skin on One Edge, Clamping in Fixed Position, and Moving Meat Piece Forward, Permitting It to Turn While Skin is Pulled Free—*W. F. Weber to Armour and Company, Chicago.* No. 2,493,707. Jan. 3, 1950.

Cocoa Syrup Emulsion Stabilized by Mixing Cocoa With Edible Fat Containing Stearyl Radical in Water Suspension, Heating Substantially to Boiling Point, Cooling Mixture to 40-70 Deg. C., Adding Base to Obtain pH of 8 to 9, Cooling to 30-45 Deg. C., Adding Acid to Give pH of 5.5 to 6.9, Adding Dispersoid, and Cooling to Room Temperature—*B. S. Whittingham, New York City.* 33⅓ Percent to *J. S. Colyer* and 33⅓ percent to *J. N. Wanshel.* No. 2,493,732. Jan. 3, 1950.

Water Soluble Hydrolysate Made From Milk Casein—*J. A. Reyniers, Niles, Mich., to Amino Acids Inc., Wilmington, Del.* No. 2,493,777. Jan. 10, 1950.

Avocado Meat Subjected to Lactic Acid Bacilli Fermentation and Mechanical Pressing to Form Product of Cheese-Like Consistency Having Higher Oil Content Than Original Meat—*L. E. Harrison, Fallbrook, Calif.* One-half to *M. J. Anderson, Hollister, Calif.* No. 2,493,818. Jan. 10, 1950.

Coffee Made in Automatically Controlled Unit Including Hot Water Reservoir and Plurality of Coffee Brewing Tanks—*D. F. Swanson, Chicago.* No. 2,493,932. Jan. 10, 1950.

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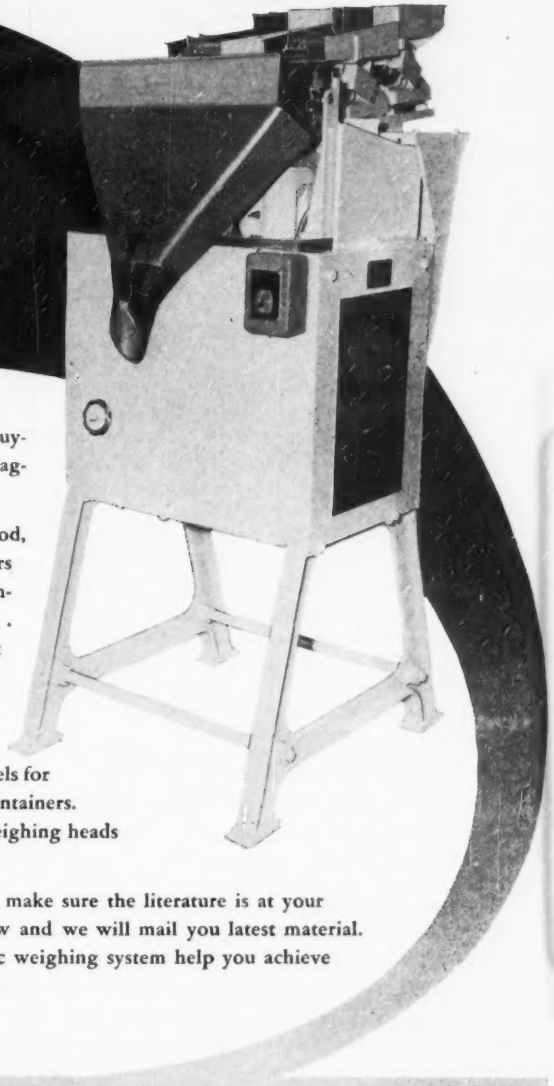

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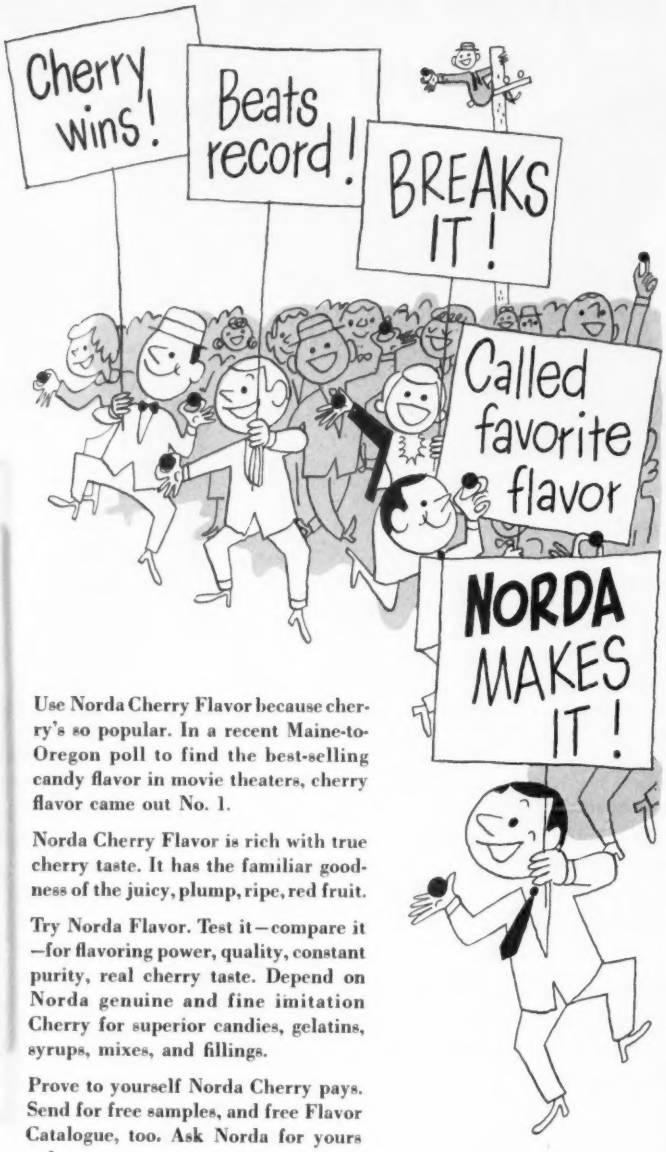

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Foods Frozen in Elongated Tunnel Divided Into Adjacent Conditioning Chambers Maintained at Different Freezing Temperatures and Equipped With Continuous Conveyor.—*G. A. M. Anderson, to The King Co., Owatonna, Minn. No. 2,494,027. Jan. 10, 1950.*

Fatty Materials Stabilized Against Reversion and Rancidity by Addition of Mixture of Small Amounts of Nordihydroguaiaretic Acid, Citric Acid and Lecithin.—*H. C. Black to Swift & Co., Chicago. No. 2,494,114. Jan. 10, 1950.*

Meat Tenderized by Passing Between Pair of Rolls Equipped with Plurality of Toothed Knives Equipped With Back Comb Having Teeth Interleaved With Knives of Back Roll and Second Back Comb With Teeth Interleaved With Knives of Front Roll—*C. O. Marshall, Jr., and M. C. Yeasting, to Toledo Scale Co. No. 2,494,136. Jan. 10, 1950.*

Sheep, and Like, Skinned by Mechanical Pulling of Pelt From Carcass—*L. De Moss, Des Moines, Iowa, to Swift & Co., Chicago. No. 2,494,138. Jan. 10, 1950.*

Gel-Like Aqueous Curds of Crude Lactalbumin Percipitated From Whey Destabilized Without Forming Solution of Lactalbumin—*W. E. Truce, Lafayette, Ind., to Swift & Co., Chicago. No. 2,494,148. Jan. 10, 1950.*

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Lime-Sulphur-Dioxide Brine From Barreled Cherries Treated With Solid Water-Insoluble Hydrogen Ion Exchange Material for Recovery of Flavor, Sugar, and Organic Acid Constituents—*G. B. Nickol, Cincinnati, to National Distillers Products Corp. No. 2,494,257. Jan. 10, 1950.*

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—End

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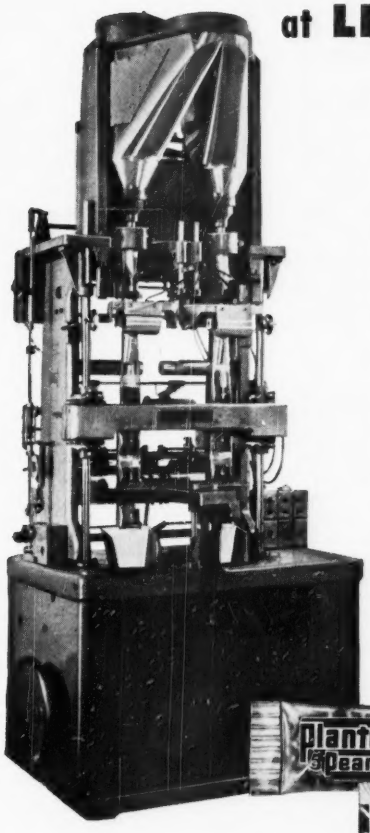

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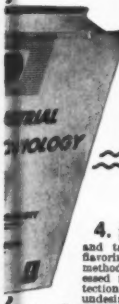

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Time-Motion Improvements

—*Continued from page 37*

these things to the workers. Although motion pictures can show correct methods to a worker, she cannot have the film handy at all times to check her procedure. She should be given some way of comparing her performance other than by film.

A job description is the written outline of the methods to be used on a certain operation. In accompanying columns we reprint a job description for the husker women in the corn packing plant. The operation consists of taking unhusked ears of corn from a chute and placing them, stalk-end out, on a conveyor, which carries the corn through the automatic husker. Some of the women on this job complained of backaches and general tiredness.

The correct method for this job was ascertained by use of operation charts and micromotion study. These analyses showed the women were fatigued because they kept shifting their heads to alternately focus their eyes on two locations. The improved method clearly describes the procedure to be followed by the head and eyes. After installation of the improved method, the tiredness and backaches of the women were greatly reduced, and production was increased.

Process Charts

In previous articles we showed the symbol-chart procedure for analysis of the flow of materials or men—to put the finger on waste effort and time. We now wish to point out that much waste of effort and time also occurs in the path followed by the various record forms employed in any organization. Much of the time and effort waste may be connected with the human beings handling the forms. It becomes advantageous to combine on one chart the flow of the form or forms and the activities of those individuals who have something to do with the forms as they pass from desk to desk.

A typical illustration is the procedure with a purchase requisition when it comes to the purchasing agent's office. Shown with this article is a process-analysis chart illustrating the procedure. From the analysis, we can determine in this case that the purchasing agent was overloaded because of the fact that he was doing many clerical operations, such as signing all the forms, tearing the forms apart, inspecting the forms for information, etc. In the improved method, most of this work was given to the secretary. The purchasing agent signed only the purchase requisition and the secretary rubber-stamped his signature on the actual purchase orders.

This same procedure can be used to follow any written information—from mere notes giving orders to personnel on up to specialized printed forms for management records. The method can be applied not only in the office of any plant but in the manufacturing or productive branch as well.

In short, it is important to remember that the principles and technics described can be applied to areas other than production. Wherever human activity takes place we have an area for improvement. Improvements can be found in the procedures of the warehouse, field crews, and office workers in any canning plant, and even in such facilities as the canteen operated for the convenience of the employees.

Waste Control

Food processing plants by the very nature of their work have waste products. It is the aim of all plant managers to keep this waste at an absolute minimum. However, many plant managers are not aware of the possible savings through the control of waste, because they feel that whatever waste they have cannot be reduced. Expenditures attempting to reduce this present waste are often considered lost money.

But there is a good way to determine whether an expenditure for new equipment or for means of preventing waste is worthwhile—that is, performance of an experiment to determine the exact amount of waste. The amount of waste can then be translated into dollars and cents. This value is readily comparable to the proposed expenditures for any preventive measure.

In the case of the whole kernel corn canning plant, the waste (other than husks and cobs) was given to farmers in the area, and it contained many good kernels. It was proposed that something be done to prevent this waste, since the correctly adopted policy of not using product after it once touches the floor should be maintained. To determine the value of these kernels an experiment was performed by sampling the waste and determining by separation the amount of good whole kernels in the waste. Results showed that there was enough corn wasted in a 9-hr. period to make 37 cases of canned corn, or about 74 cases for the normal canning day. The number of cases lost, when translated into dollars and cents, indicated that expenditures for repair and proper maintenance and replacement of equipment would pay for itself.

Although time study is not regularly adopted in canning plants, wage incentives frequently are applied under

a group plan. The bases for such wage incentives are usually production records. But in the canning industry, production is not as easily measured as in manufacturing industries. Manufactured products in a plant can be considered the same size and weight from day to day. However, in the canning plant ears of corn usually vary in size and weight from day to day. Regardless of its characteristics however, the ear must be handled and processed in the same way.

The husker women in the corn plant were paid a group bonus based on the tonnage of corn handled through the huskers. Since the husking machines were run at a constant speed, only so many ears of corn could possibly be processed per minute.

There came a time when the women did not get a bonus, despite the fact that the number of ears produced was equal to or above the usual output. The reason for this was found by taking samples of the ears of corn throughout the day and determining the number of ears per 100 lb. By performing this calculation each day, the number of ears per ton could be calculated and the women paid a bonus, not on the total tonnage, but on the appropriate number of ears handled.

Nobody knows his business better than the man in the business. However, this same man sometimes loses sight of valuable potential improvements because of his familiarity. Industrial engineering and motion and time study are nothing more than a scientific procedure for applying ordinary common sense. The principles for analysis and improvement are the same, whatever may be your branch of the food industry.

—End—

Hard Water Costs

—Continued from page 60

mineral acidity of the decationized water, the two streams may be blended to give a low total dissolved solids water of zero alkalinity and low hardness. Where all alkalinity is due to bicarbonate anions, decationizing will completely demineralize the water for the purposes of the bottler. The accompanying flow-sheet shows such an operation on raw well water of moderate hardness and alkalinity.

Decationizing and blending, instead of demineralizing with both cation and anion exchangers, is somewhat more economical, solves the soft beverage bottlers' acid loss problem satisfactorily, and leaves traces of salts in the water. This latter point is significant, since 10 to 20 ppm. NaCl brings

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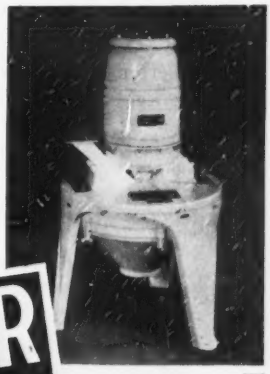

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out the flavor of the beverage much as it does that of food. The technic of just decationizing and blending is being used by some progressive bottlers today.

Units Do It Safely

Suppliers of equipment for water demineralization can provide units equipped with instruments to safely carry through the regenerative cycles. With these controls, no water can pass through to a usable storage unless it is of desired minimum electrical resistivity and/or free mineral acidity (by pH). Time between regenerations is set by the volume of flow through the beds.

The regeneration cycle time is indicated by lights and/or alarms, and the operator must push a button to start each cycle. After all the steps—backwash, regeneration, and rinse—are completed the unit automatically goes back into service, if desired. Each step is timed by turning a knob, without such adjustments interfering with any later steps. These positions, once established by the manufacturer, can be locked to prevent tampering by persons unacquainted with the units.

Two sets of timers and other aids can be installed to allow for emergency use. Regenerative acids and caustic are automatically measured out and are diluted ready for use. Each specified step in the operating cycle must be successfully completed before the next can start. If something goes wrong during a step, this is indicated at once on an illuminated control panel so that proper action can be taken.

On the panel, an open valve is indicated by a light actuated from the actual position of the pneumatic or hydraulic valve in its physical movement. The operator can follow the regenerative cycle on the board continuously, or intermittently if his attention is occupied with other duties.

—End—

Guide for Spotting Pests

—Continued from page 48

carefully, represent a constant source of infestation. Unless tops are kept on drums, rodents and insects will breed in these areas. Cans should also be placed so that they cannot be tipped. Empty egg cans also create a problem if they are not rinsed. The longer garbage accumulates, the greater the problem.

Roofs, such as on elevator pent houses, may be infested, since flour and dust accumulate there. Fan houses and ventilators may offer an avenue of entry if they are not screened. Mosquitoes and flies may also breed there

if the overflow from the cooling tower is not properly piped to a downspout.

In short, there is not a single area in the bakery that cannot be infested. But if your inspection has been thorough and complete, chances are that you have unearthed either insects or rodents themselves or evidence of their presence. If the evidence is slight and it indicates only an occasional invader, your problem is only one of vigilance—to keep infestation from starting, with the accent on cleanliness to make living conditions unfavorable for pests.

On the other hand, if the evidence points to heavy infestation, more stringent control measures must be immediately taken, or your bakery faces possibility of citation by the Food & Drug inspectors. The wise baker "locates the bugs in his bakery before the inspectors find them for him."

Remember that the control of pests in your plant consists of 85 percent good housekeeping and less than 15 percent dependence on insecticides or fumigants.

—End—

Service Means Profit—If

—Continued from page 80

distinctive round package, easy to wrap and at a lower cost. After the franks are skinned, they are placed, one at a time, on a stainless steel conveyor that delivers them to an automatic machine. Here, they are banded, cartridge-like, in units of ten. Then the franks are check-weighed and placed on a stainless steel band conveyor that takes them to other wrap and twist machines, where they are done up in cellophane, which is spun at the ends.

Link sausages are weighed to 1-lb. units and placed on the same band conveyor, which delivers them to eight wrapping stations, four on each side of the band. Sausages are filled into cellophane bags by manually operated bag fillers. These fillers consist of an open-end box with a sliding wooden plunger. A bag is slipped over the end of the box and the sausages are inserted in the box. Filling is accomplished by pushing the plunger forward to force the sausages into the bag.

Greater speed and flexibility are features of the new bacon-wrapping line. A high-speed bacon slicer, equipped with a revolving knife, cuts slabs of bacon at the rate of 800 pieces a min. Then the slices are assembled in ½ and 1-lb. units, of which 60 percent are cellophane wrapped and heat sealed each minute by machine, the rest going to hand wrapping.

The bacon line is used to wrap two different kinds of packages, simultane-

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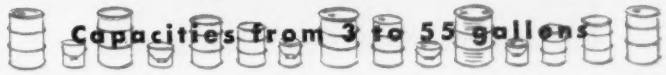

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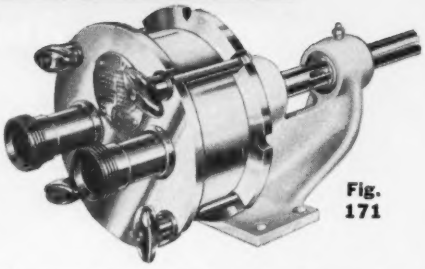

Fig. 171

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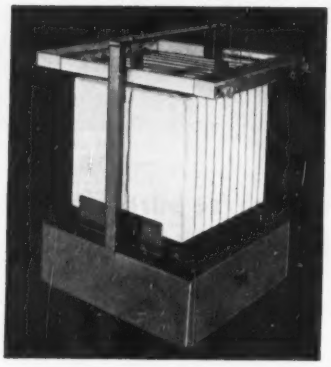

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ously if required. For, example, sliced bacon can be weighed on cardboard flats by three girls and then fed to the wrapping machine, at right angles to the line. And at the same time, some of the bacon may be sent down the conveyor to a second station where 5 to 7 girls weigh it and hand wrap it in conventional cellophane packs.

—End—

Mexico Food Plant

—Continued from page 77

cotton firm, designed and built the plant, which has been hailed as outstanding among the newest and most progressive facilities. Virtually all equipment is of American make.

ACCO used its Mexican profits in the financing, and its confidence in the country's economy is reflected in the recent announcement that an additional $4,000,000 expenditure is planned this year for expanding activities south of the Rio Grande. It is understood that more than $500,000 will go into domestic advertising alone—a major promotion.

Central feature of the new plant is the four-story brick and steel building in which the processing operations are carried out. Tank cars bring crude cottonseed oil to this building from oil

■ A graphic foldout picture-flowsheet portraying the Mexican ACCO plant's margarine-making operation —from crude oil to finished product—is being prepared for an early issue of FOOD INDUSTRIES. Watch for it.—The Editors.

plants in various parts of the country. The oil is refined to remove fatty acids and it is further purified by several washings. A 72-hr. "winterization," or cold treatment, crystallizes stearines in the oil. These stearines are then removed by filtration.

The new plant manufactures its own hydrogen, which is used to hydrogenate the oil, giving the product plasticity and stability. Every effort is made to insure the highest degree of product purity by constant checks in the quality-control laboratory. Finally, products are bottled and packed in a modern line operation, using mass-production equipment.

A newly recruited, extensively trained sales force sells the products throughout Mexico. Distribution will be speeded by a fleet of new refrigerated trucks and the company's own refrigerated cars. Smaller refrigerated trucks will carry the products from warehouse to retail stores.

It is also to be noted that another facility, like that at Monterrey, is being opened by ACCO in Sao Paulo, Brazil, for making and distributing similar food products (Feb. FI). Here, however, two plants are being incorporated—a tin plate assembly unit for producing cans, contiguous with the new plant that will turn out the cooking oils and other products. The Sao Paulo expenditure, again over $2,000,000, brings the total outlay for the two plants to some $5,000,000.

—End—

It's a Chemical

—Continued from page 81

rate of reaction with sodium bicarbonate permits handling by automatic machines. This product has also been shown to have a beneficial effect on flour gluten, resulting in baked goods with improved volume and texture.

As for the doughnut use, F. H. Hubbard and co-workers at Monsanto have developed a type of sodium acid pyrophosphate leavening agent designed especially for a doughnut mix to be used in automatic machines. This agent controls reaction rate and texture, producing doughnuts of superior quality and appearance.

Carrier for Enrichments

In recent years much interest has been displayed in improving the nutritional status of large population groups through fortification of certain refined foods with mineral and vitamin supplements. Calcium phosphates are used as calcium sources, and iron phosphates as iron and phosphate sources. In self-rising, and phosphated flours, the calcium phosphate leavening acid also acts as the calcium enriching agent. For enriching farina, a special blend of sodium phosphate, iron phosphate and calcium phosphate is prepared that simulates the farina particle in size and color. In this way, the enriching and buffering agents are indistinguishable.

While not a direct use, there is now employment by the yeast industry of mono- and diammonium phosphates as sources of nitrogen. Walter[7] discusses their use and adds that they serve as a supplementary diffusable nitrogen source. Thorne[8,9] has shown that yeasts grow better and faster when the nitrogen source is diversified. For example, when he used two sources he got better yeast growth than with one. And with three sources, he obtained even better results than with two. He also found that monoammonium phosphate was a better nitrogen source than most amino acids.

For many years, phosphates have

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been an important ingredient of the substances called "bread improvers" or "yeast foods." These are added to the dough at mixing time to provide a "lift" to the yeast in order to insure an early and vigorous fermentation. Certain phosphates have shown value in controlling ropiness in bread. Monocalcium phosphate, either alone or in combination with "Myceban," is used for this purpose.

Used In Beverages

Another large consumer of phosphates is the soft drink industry. Here, edible phosphoric acid is used as an acidulant. It finds most use in the heavier leaf, root, or nut flavored drinks, where the sparkling bite and astringency serves to counteract the heaviness of the basic flavor. It has also been used where preservative action is desired.

An interesting new development is the soft drink powder made from powdered monocalcium phosphate, a fruit acid, flavoring and coloring. When the mixture is added to a glass of water a soft drink is produced.

In Jams and Jellies

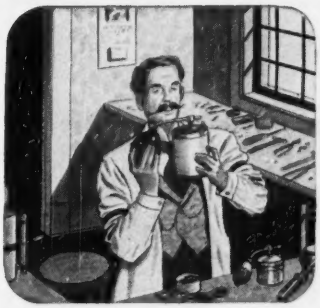
Phosphoric acid is employed in the jam and jelly industry, especially for production of very firm, non-soaking jellies such as used in jelly doughnuts, rolls, and cake fillings. Interesting here is the manner of acid application: The jelly, without acid, is brought to the finish point, then poured into the final container, to which a measured amount of the acid has previously been added. After thorough blending, and a slight cooling period, the mix sets quickly into a stable, firm jelly. Because this type jelly must stand abuse, it is brought to a high solids content.

Certain of the phosphates are also added to gelatin-type desserts, where they function as buffers to provide the proper environment for gelation.

Increases Pectin Yield

Another new use for phosphates is in the fruit juice industry, where the calcium sequestering power of sodium hexametaphosphate has been used to prevent formation of calcium-pectate gels, and to produce a juice of higher viscosity. Baker and Gilligan[4] found that, by preventing formation of these undesirable gels, about twice the usual amount of pectin is extracted. Maclay and Nielson have applied the same principle to a patented process for extracting pectin[5]. Baker and Gilligan[6] have also reported that commercial jellymaking may be benefited by application of sodium hexametaphosphate during the extraction of apples, oranges and other fruits. They found an increased jelly value (62 percent

1 **1875**—For centuries, hard labor and a paintbrush were man's main means of adding beauty and color. But, with the industrial revolution at hand, new devices were sorely needed to break this bottleneck.



2 **1900**—The artist's airbrush was born. On its heels came the paint spray gun. Both products, strangely enough, stemmed from the atomizer used by doctors to prevent colds. Painting swung into high gear.

3 **1915**—Portable paint-spraying equipment was introduced in this, the year Howell "Red Band" Electric Motors arrived. Soon these rugged motors made important contributions to this and other industries.

PAINT . . . protects, preserves, decorates and sells!

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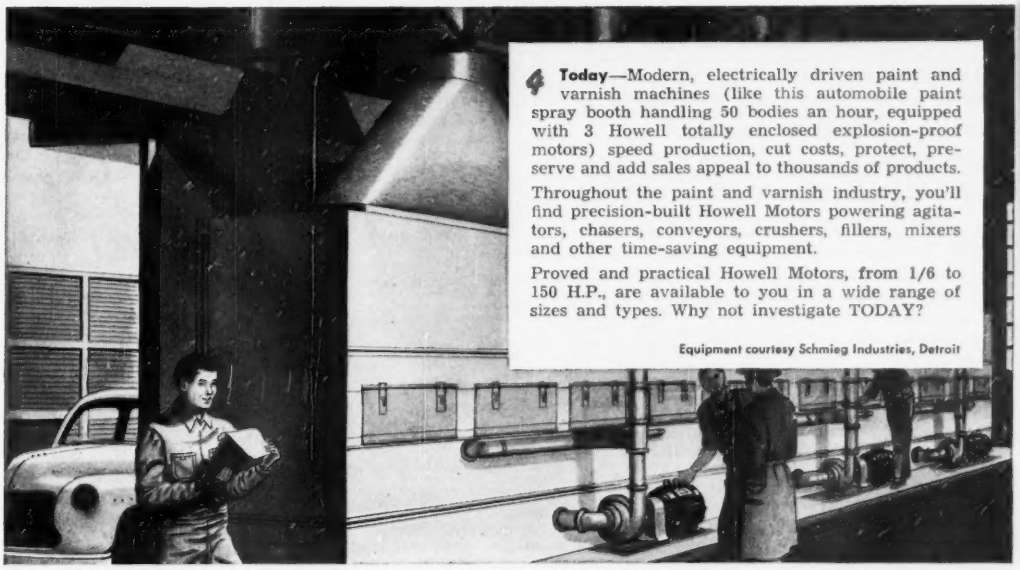

4 **Today**—Modern, electrically driven paint and varnish machines (like this automobile paint spray booth handling 50 bodies an hour, equipped with 3 Howell totally enclosed explosion-proof motors) speed production, cut costs, protect, preserve and add sales appeal to thousands of products.

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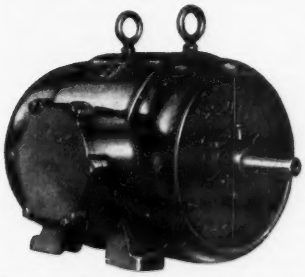

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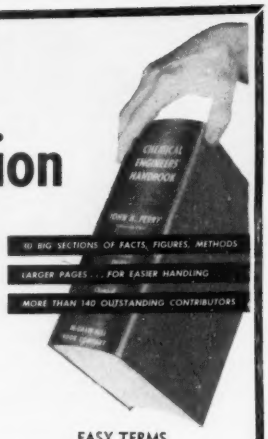
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over normal) when polyphosphate was used.

Hall[7] has recently patented the use of sodium hexametaphosphate and other condensed phosphates in the preparation of red-colored juices. He claims that better color, viscosity and yield is obtained.

Other Applications

The calcium chelating capacity of sodium hexametaphosphate has been used to advantage in the canning industry to prevent toughening of pea skins. Holmquist, Schmidt and Guest[8] observed the ion exchange nature of pea skins, and were able to produce a satisfactory soft-skinned pea by addition of this product to the blanch water in amounts chemically equivalent to the calcium and magnesium present in the water.

A new development of interest to users of pyrophosphate baking powder was the antioxidant synergism exhibited upon tocopherols by certain pyrophosphates[9]. Baked goods prepared with sodium acid pyrophosphates showed marked resistance to rancidity.

There are certain other applications of phosphates which transcend specific industry boundaries. For example, tricalcium phosphate has found wide use as an anti-caking agent. A small percentage in salt, confectioners sugar, baking soda or powdered milk helps to keep the products free-flowing.

It may be noted, too, that disodium phosphate is added to cheese to help emulsification and prevent unsightly "oiling-off."

Another borderline application, which is closely allied to the food field, is the use of phosphates in food plant sanitation work. Here, they lend valuable assistance in emulsifying fats and sequestering calcium and magnesium in soap-destroying hard water. Trisodium phosphate is used wherever a good emulsifying agent is required, and has found particular application in the dairy industry where the residues have a high fat content.

Tetrasodium pyrophosphate is used where a combination emulsifier and sequesterer is required. It is an important constituent of many commercial cleaning compounds. When detergency, or soil removal is required in addition to sequestering, sodium tripolyphosphate is frequently used. The many applications of sodium hexametaphosphate, or Calgon, as a chelating agent are too well known to repeat here.

Commissioner Paul Dunbar of F&DA recently declared that there is no inherent objection, under the Food, Drug, & Cosmetic Act, to adding a really useful chemical compound to a food product, provided it is safe and doesn't conceal inferiority. This atti-

tude is evidence of the good work that has resulted from the chemical and food industries attacking a problem shoulder-to-shoulder and arriving at conclusions which benefit both producer and consumer.

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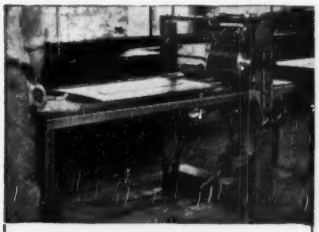

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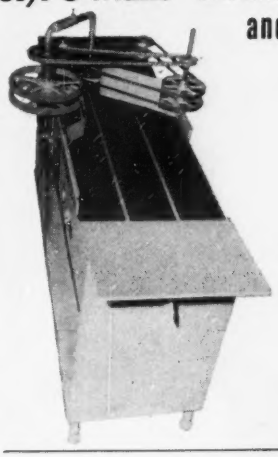

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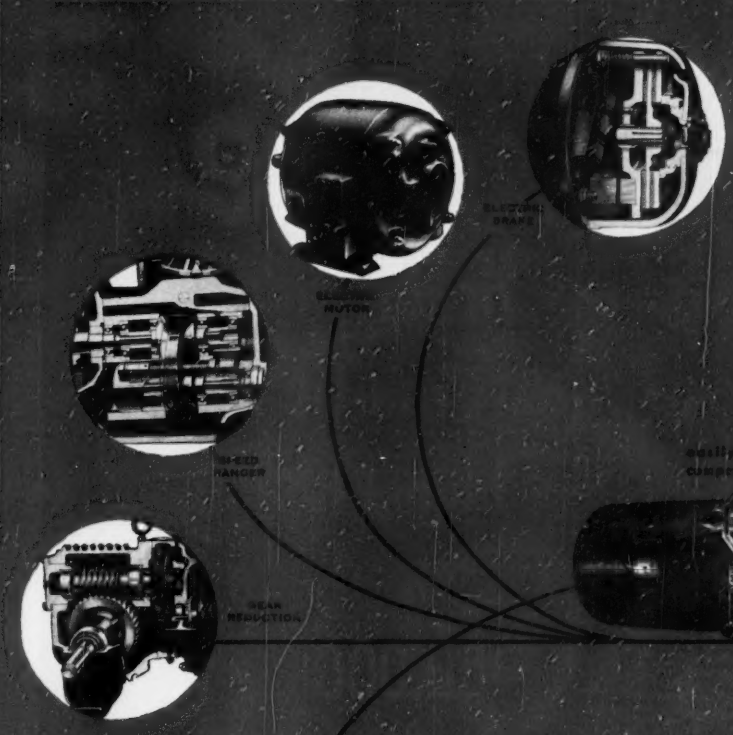

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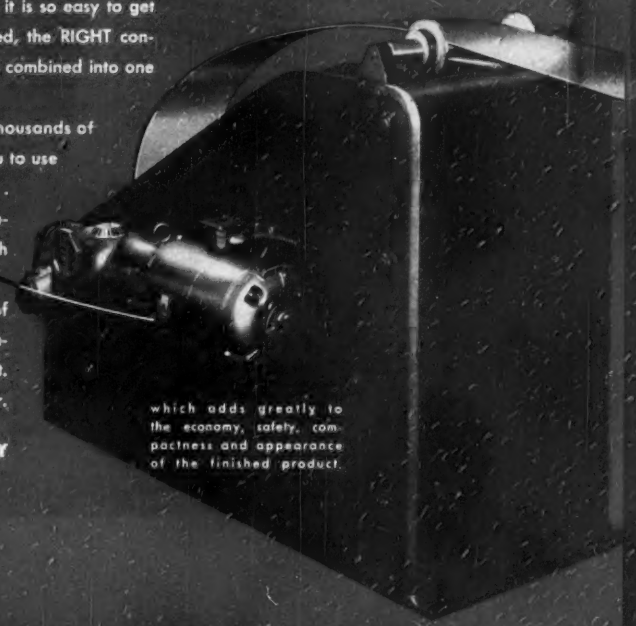

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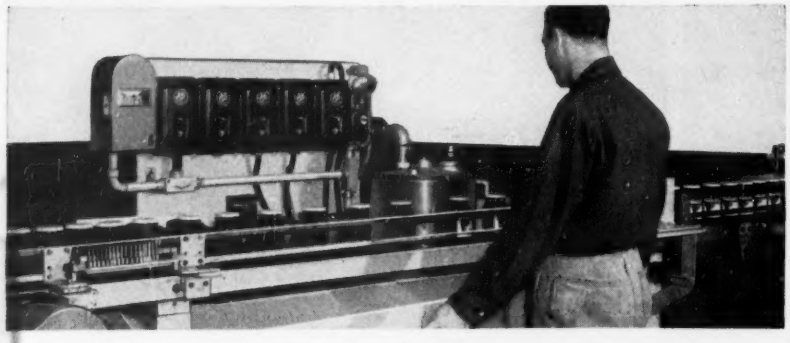

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LUBBOCK, TEX.
Carpenter Paper Company
MILWAUKEE, WISC.
Bradner Smith & Company
Dwight Brothers Paper Company
MINNEAPOLIS, MINN.
Carpenter Paper Company
The John Leslie Paper Company
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Bulkley, Dunton & Company
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Harry Elish Paper Company
George W. Millar & Company
Whitaker Paper Company
OGDEN, UTAH
Carpenter Paper Company
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Carpenter Paper Company
PHILADELPHIA, PA.
Rhodes Paper Company
D. L. Ward Company
PITTSBURGH, PA.
Whitaker Paper Company
PORTLAND, ORE.
West Coast Paper Company
PROVIDENCE, R. I.
Carter, Rice & Company
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Carpenter Paper Company
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The Alling & Cory Company
ST. LOUIS, MO.
Acme Paper Company
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Carpenter Paper Company
The John Leslie Paper Company
SALT LAKE CITY, UTAH
Carpenter Paper Company
SAN ANTONIO, TEX.
Carpenter Paper Company
SAN FRANCISCO, CALIF.
Carpenter Paper Company
SEATTLE, WASH.
West Coast Paper Company
SIOUX CITY, IOWA
Carpenter Paper Company
SIOUX FALLS, S. D.
The John Leslie Paper Company
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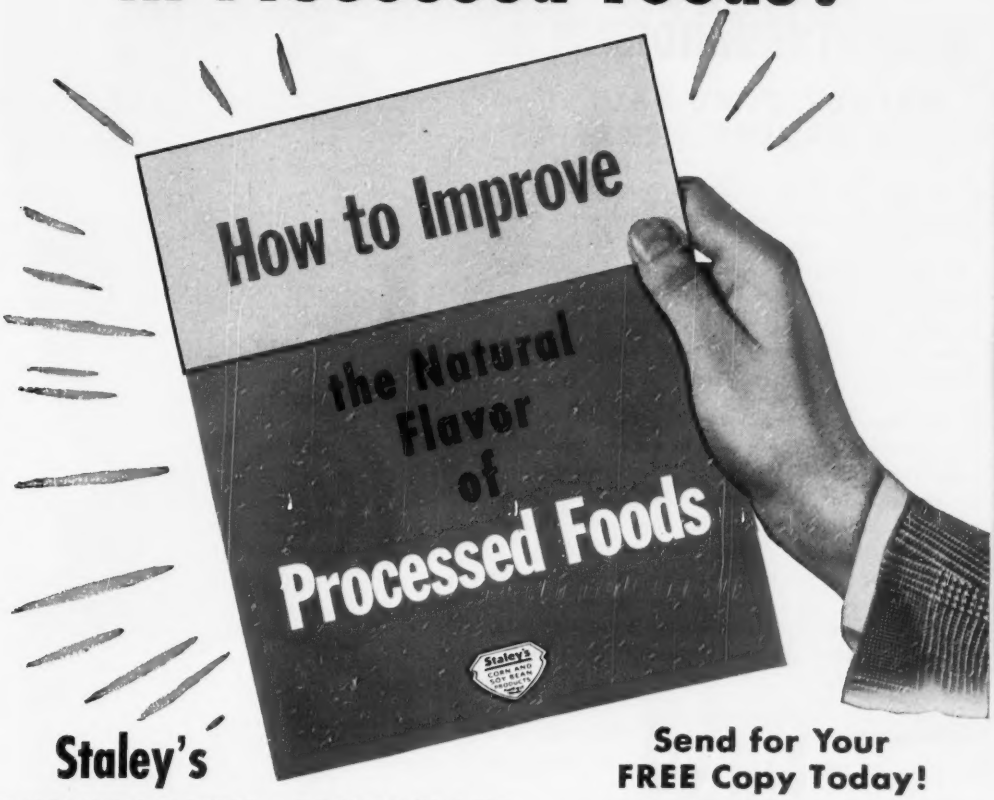
FREE-Learn How Miracle Product Locks "Fresh Flavor" in Processed Foods!



Staley's
MONOSODIUM GLUTAMATE

Use Before, During, or After Processing

Discover the sensational product that magnifies natural flavor . . . helps prevent weakening original goodness by heat, pressure and other processing conditions. It's Staley's 99+% Pure Monosodium Glutamate . . . this booklet tells you how it works . . . how it makes your processed foods taste amazingly better!

A. E. STALEY MFG. CO.
Decatur, Ill.

Send for Your FREE Copy Today!

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Gentlemen:

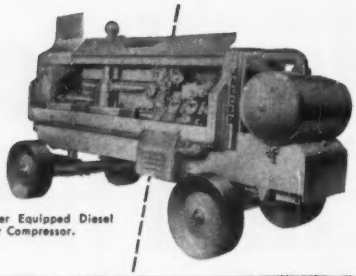
Please rush me at no cost or obligation your latest data showing how Staley's Monosodium Glutamate stops fading flavor during food processing!

*Name*_____ *Title*_____

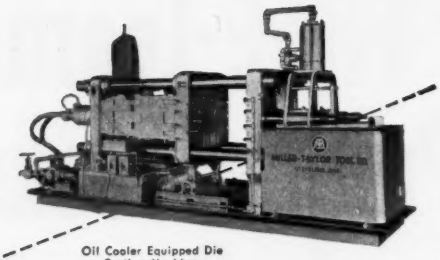
*Company*_____

*Address*_____

*City*_____ *State*_____



Oil Cooler Equipped Diesel Air Compressor.



Oil Cooler Equipped Die Casting Machine.

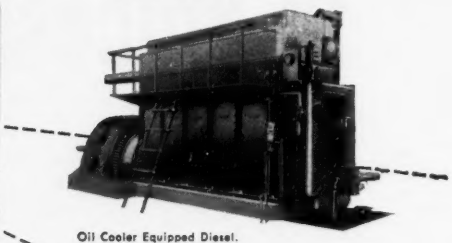
IN STOCK UNITS OR HIGHLY SPECIALIZED DESIGNS

ROSS STANDARDIZATION

BRINGS TIME-SAVING, COST-SAVING BENEFITS

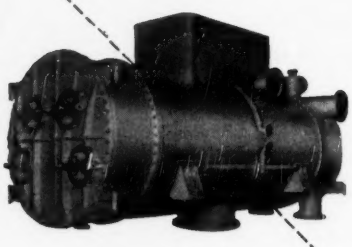
As both machinery manufacturers and users well know, Ross' complete standardization and mass production of smaller size exchangers enable the immediate shipment of many units from stock and the immediate assembly of many others from stocked parts. The net result is extensive use of Ross exchangers as original accessories by the Diesel, hydraulic machinery and like industries.

But the time-saving, cost-saving benefits of Ross standardization are not limited to size and type. Many apply to even the most specialized of custom-engineered exchangers. For having completely standardized and carefully classified all essential components of such larger, more complex equipment as power plant surface condensers, refinery heat exchangers*, high pressure bleeder heaters or mammoth fuel oil heaters . . . Ross can eliminate many of the engineering and fabricating costs and delays commonly associated with specially engineered units.



Oil Cooler Equipped Diesel.

High Pressure Bleeder Heater.



Surface Condenser.

* Ross refinery type heat exchangers conform thermally and mechanically to standards of Tubular Exchanger Manufacturers Assn. of which Ross is a member.

ROSS EXCHANGERS . . . MAKE OTHER PRODUCTS BETTER

As part of your program for greater plantwide productivity, it would be to your advantage to be familiar with the full details of cost-reducing, time-reducing Ross standardization. Write.

ROSS HEATER & MFG. CO., INC., Division of American Radiator & Standard Sanitary Corp., 1443 West Ave., Buffalo 13, N. Y.

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AMERICAN STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON

it's a grand feeling...

There's nothing like a good cup of coffee to start a man's day right, and Paxton and Gallagher Co., Omaha, Neb., does just that with their famous "Butter-Nut" coffee.

The delicious aroma and flavor of "Butter-Nut" coffee are retained by Crown's Deep Hook Thread caps, Slip Rubber Ring lined—a perfect original seal and re-seal. The cap threads under-grip the jar thread and the thick-cut rubber rings take care of glass variations.

Crown specializes in sealing glass containers, and its vast manufacturing facilities, research and analytical laboratories are at your service for the asking. Crown Cork & Seal Company, Baltimore 3, Md. *World's Largest Makers of Metal Closures.*

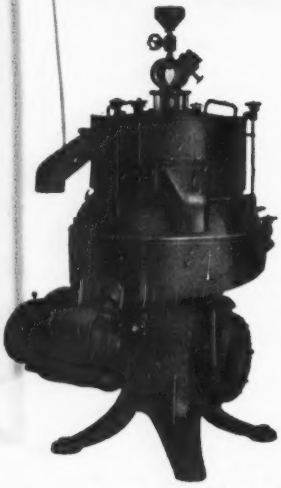
CROWN CLOSURES

Approved by millions of housewives

WHAT'S YOUR SEPARATION PROBLEM

"I am De Laval Centrifugal Force. I have helped many Process Engineers speed up separation or clarification by doing the job *continuously*. I force less efficient, slower methods of separating or clarifying liquids into the discard.

I'VE GOT THE ANSWER IN TERMS OF ECONOMY



DE LAVAL "NOZZLE-MATIC" SEPARATOR
Model AC-VO

For continuous separation of two liquids and simultaneous continuous removal of solids from the liquid mixture.

SPEED AND A BETTER PRODUCT!

"I am an economical force, too — I operate wholly mechanically and require no replacement of parts as I do my work. Therefore, I am just as efficient at the end of a long run as at the beginning.

"De Laval supplies many different types and sizes of machines to enable me to be used to best advantage. Some are small laboratory models . . . some, large 'Nozzle-Matic' machines with capacities up to 6,000 gallons per hour or even more, depending on the nature of the liquids being separated.

"For more information about how De Laval Centrifugal Force can help ***you***, write me at this address."

THE DE LAVAL SEPARATOR COMPANY
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DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5
THE DE LAVAL COMPANY, Limited, Peterborough, Ont.

De Laval **CENTRIFUGAL MACHINES** ***For Processing Systems***

stainless steel is a family affair

There's more than just one type of stainless steel . . . because *stainless* applies to a family of steels. And in order to get the best possible results from stainless in your application, the *right* analysis must be used.

That's why Crucible, a pioneer in the development of this specialty, offers you the services of an alert staff of metallurgists to help you with your stainless application problem.

Crucible's half century of specialty steel leadership is built on a strong foundation of service to Industry . . . with attention to detail . . . whether the order is in tons or pounds. From the ground up, Crucible designed and put into operation one of the first integrated mills built specifically to hot and cold roll stainless steel. This $18,000,000 addition gives Crucible facilities to provide industry with stainless in every form.

There is no substitute for Crucible's background of 50 years of specialty experience. Let Crucible show you how to apply stainless steels to your products. One call from you puts us to work on your application.

CRUCIBLE STEEL COMPANY OF AMERICA, Chrysler Building, New York 17, N. Y.

CRUCIBLE first name in special purpose steels

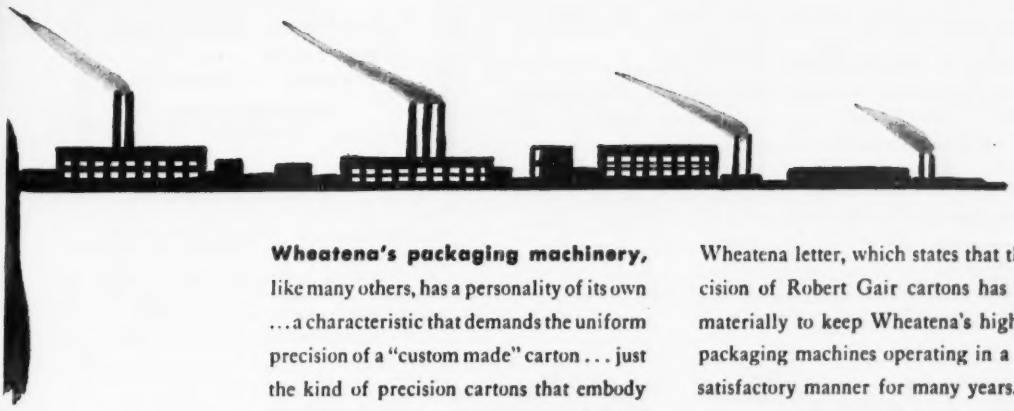
STAINLESS STEELS

STAINLESS • HIGH SPEED • TOOL • ALLOY • MACHINERY • SPECIAL PURPOSE • STEELS

Wheatena
THE · WHEATENA · CORPORATION
WHEATENAVILLE
RAHWAY · NEW · JERSEY
7 April 1948
Robert Gair Company, Inc.
155 East 44th Street
New York 17, New York
Gentlemen:
Many visitors to Wheatena here at Rahway, have remarked that we have the most complete automatic packaging operation in the world.
Whether or not this is an over-statement, we do know that our superhuman machines are entirely dependent on the precision with which the cartons are made.
Fortunately, the Robert Gair organization recognized this fact years ago and have made every effort to preserve the precision of their product and thus help us keep our machines operating in a highly satisfactory manner.
Very truly yours,
THE WHEATENA CORPORATION
By Arthur R. Wendell Jr.
President
ARW:lb
GAIR

Well in Hand!

...for half a century



Wheatena's packaging machinery, like many others, has a personality of its own ... a characteristic that demands the uniform precision of a "custom made" carton ... just the kind of precision cartons that embody the experience, the "know how" and the infinite care of the Robert Gair organization.

You will understand why our cartons are always GAIRanteed when you read the Wheatena letter, which states that the precision of Robert Gair cartons has helped materially to keep Wheatena's high-speed packaging machines operating in a highly satisfactory manner for many years.

Our technical staff is at your service when you contemplate an improvement in your packaging facilities or when you plan the ideal carton for your new product.

Write for booklet on Precision Packaging

ROBERT GAIR COMPANY, INC.

NEW YORK • TORONTO

PAPERBOARD • FOLDING CARTONS • SHIPPING CONTAINERS

Ask any Dietitian—she'll tell you

"Enriched Foods and Fortified Foods are *Preferred* Foods"

AMERICAN dietitians and nutritionists long ago added their endorsement to the Bread and Flour Enrichment Program. And again they have been proved right by the results of the large-scale Newfoundland Nutrition Surveys.

These authoritative surveys reaffirmed that enriched and fortified foods promote better bodies, *healthier* bodies, sharply reduced infant mortality, lower tuberculosis and over-all death rates—improvement in both the quantity and quality of life.

When you enrich and fortify with Merck Vitamin Products you *know* that the faith of millions of Americans is fully protected. Merck Vitamin Products come from the same organization that pioneered in the research and large-scale development of thiamine, riboflavin, niacin, vitamin C, and other important nutrients. And now, the most recent contribution is thiamine mononitrate, a form of thiamine that has the advantage of greater stability in certain food applications.

With the enrichment program, as well as general food fortification, steadily growing in stature, Merck continues to lead in every distinct, forward step.

Merck Vitamin Products for Enrichment and Fortification

VITAMIN B_1
Thiamine Hydrochloride • Thiamine Mononitrate

RIBOFLAVIN (Vitamin B_2)

NIACIN (Nicotinic Acid)

ASCORBIC ACID (Vitamin C)

Merck Enrichment Ingredients for Millers, Bakers, Cereal and Macaroni Manufacturers • Merck Vitamin Mixtures for Flour Enrichment • Merck Bread-Enrichment Wafers • Merck Vitamin Mixtures for Corn-Products Enrichment • Merck Vitamin Mixtures and Wafers for Macaroni Enrichment.

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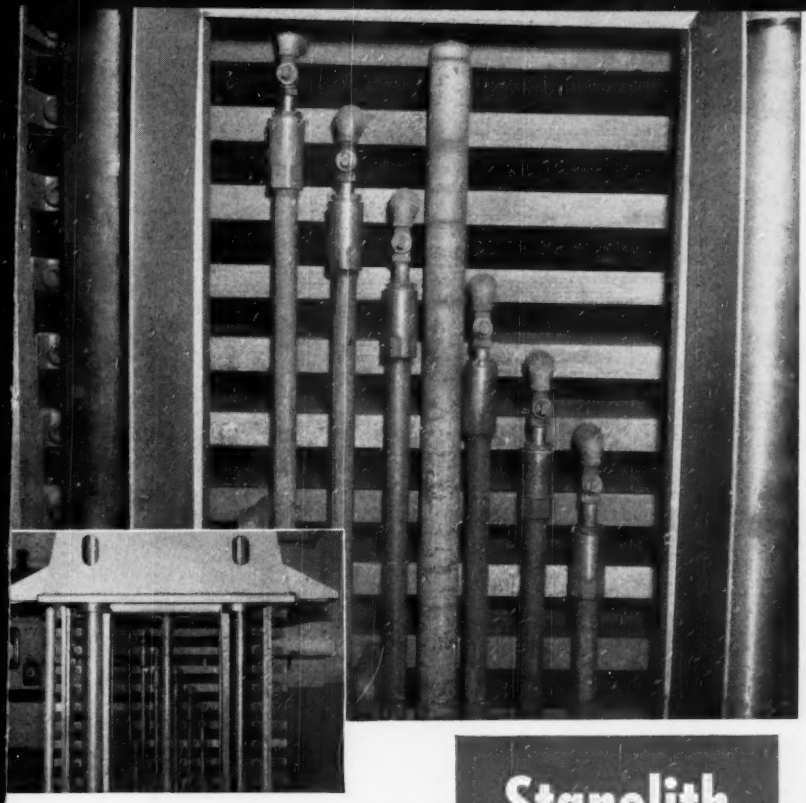
Merck Vitamin Products for Enrichment and Fortification



Stanolith Grease

Stops trouble on steam joints . . .

• Lubrication of the telescopic steam joints on a hot-plate veneer press was a continual problem for a midwest manufacturer. The job required a grease that would withstand temperatures of 240° to 260° F. and the severe washing action of steam and water.

Conventional greases failed to meet these requirements. Joints had to be lubricated frequently. This interfered with production and resulted in excessive consumption of the lubricant.

A Standard Oil lubrication specialist suggested that STANOLITH Grease No. 57 be used. This is a lithium soap product capable of standing up under high temperatures and of resisting the washing action of water. Since the switch to STANOLITH the joints have been lubricated between shifts with no interruption of production. *Lubricant consumption has been reduced 40%.*

Where the combination of heat and water causes lubrication difficulties, try STANOLITH Grease. To help you secure maximum benefits from such products, Standard Oil has a specially trained and experienced lubrication specialist located within easy reach of your plant. How you can take advantage of his services is explained at the right.

Standard Oil Company (Indiana), 910 S. Michigan Avenue, Chicago 80, Illinois.

What's YOUR problem?

D. R. Clay, lubrication specialist at Standard Oil's Grand Rapids office, solved this problem.

He is one of a corps of Standard Oil lubrication specialists located throughout the Midwest to provide "on-the-spot" service to plant operators. One of these lubrication specialists is near your plant. He has plenty of practical experience and has been specially trained for his job in a Standard Oil Lubrication Engineering School. You can obtain his services quickly and easily. Just phone or drop a card to the nearest Standard Oil Company (Indiana) office. Why not arrange, now, to discuss with him the advantages offered by these widely accepted lubricants?

STANOIL Industrial Oils—This multi-purpose line of oils provides cleaner operation of hydraulic units, supplies effective lubrication in compressors, gear cases, and circulating systems. One or two grades can replace a wide variety of special oils and lubricants.

SUPERLA Greases—Available in all consistency grades, SUPERLA Greases cover a wide range of applications. These products are comparable in quality to the highest type of special greases but are as readily available and economical as ordinary cup greases.

CALUMET Viscous Lubricants—On open gears and wire rope, these greases strongly resist washing and throw-off. Their superior wetting ability affords better coating of gears and chains, better internal lubrication of wire rope.

STANORUST Rust Preventives—The eight grades of STANORUST form one of the most complete and effective lines of rust preventives on the market today. Each has been scientifically and specifically developed for its intended use. The grades range from a finger print remover to a heavy petrolatum that protects against corrosion for years under the most severe outdoor exposure.

STANDARD OIL COMPANY (INDIANA)

Enduro®

STAINLESS STEEL

THRIFTY METAL OF 10,000 USES

Dressing tables and bacon weighing and packing units are but two of dozens of uses for Republic ENDURO Stainless Steel in the food industries. Other applications—such as kettles, sinks, hoppers, mixing tanks, pails, utensils, sanitary piping, valves and fittings—exist in every phase of food preparation, processing, packing and packaging.

...BRINGS HOME THE BACON

And it's mighty sweet bacon, too, in the satisfying form of lower maintenance and replacement costs, wherever long-lasting ENDURO Stainless Steel fits into the picture.

Sanitary ENDURO is a natural material for every type of equipment used in food processing and packaging operations. It's inherently clean . . . and easy to keep clean. It protects flavor, taste and purity. It's not affected by fruits, vegetables, meats, seafood or other food preparations . . . neither does it have any effect upon them. And because its hard, pore-free surface never requires refinishing or expensive maintenance, ENDURO keeps equipment costs at a minimum.

From every standpoint—product quality and uniformity; productivity; operating, maintenance and replacement costs—ENDURO Stainless Steel is more than a match for the most exacting food requirements.

Among the many ENDURO analyses you will find materials which exactly meet the particular needs of every food processing application. Your equipment manufacturer will be glad to give you all of the facts.

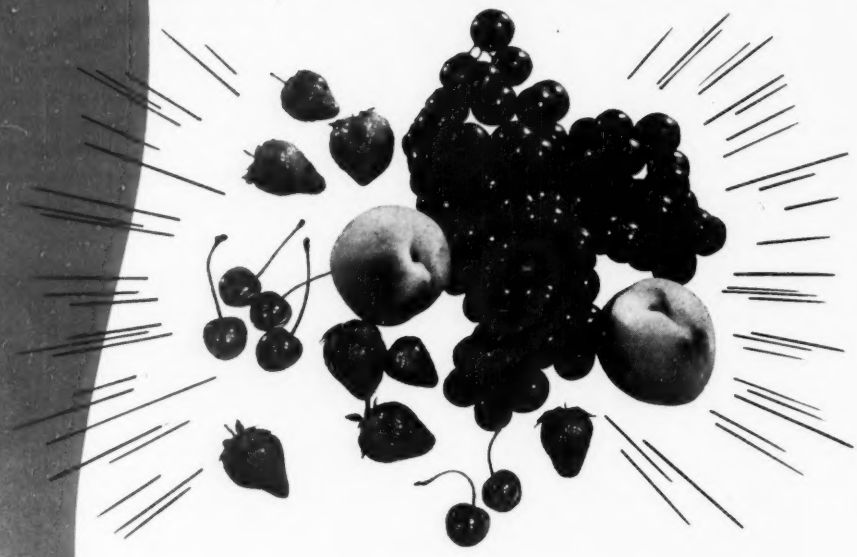
✔ **CHECK ALL 10 ADVANTAGES:** Rust- and Corrosion-Resistance • Heat-Resistance • High Strength • No Metallic Contamination • Sanitary Surfaces • Easy to Clean • Eye Appeal • Easy to Fabricate • Long Life • Low End Cost • *What more can be desired in a material?*

For Complete Details Write

REPUBLIC STEEL CORPORATION

Alloy Steel Division, Massillon, Ohio • **GENERAL OFFICES, CLEVELAND 1, OHIO** • *Export Dept.: Chrysler Bldg., New York, 17, N.Y.*

THERE *IS* SOMETHING NEW



IN *TRUE FRUIT* FLAVORS!

By adopting and improving on the new discoveries in fruit concentration WITHOUT THE USE OF FLAVOR KILLING HEAT, the ALVA laboratories now offer True Fruit flavors containing a considerably higher percentage of the fugitive volatile essences so vital to the fresh, true flavor of natural fruits.

Normally lost in distillation, these essences are initially captured and ultimately returned to the concentrate in the unusual equipment built by ALVA technicians. The result is a concentrate that is fresher, possesses more body and will go further in natural flavoring.

This remarkable technique is now standard in the production of ALVA True Fruits.

There's a difference . . . All the flavor is there . . . We'll send you samples for comparison.

Write for your copy of the complete ALVA Flavors Catalog

VAN AMERINGEN-HAEBLER, INC.
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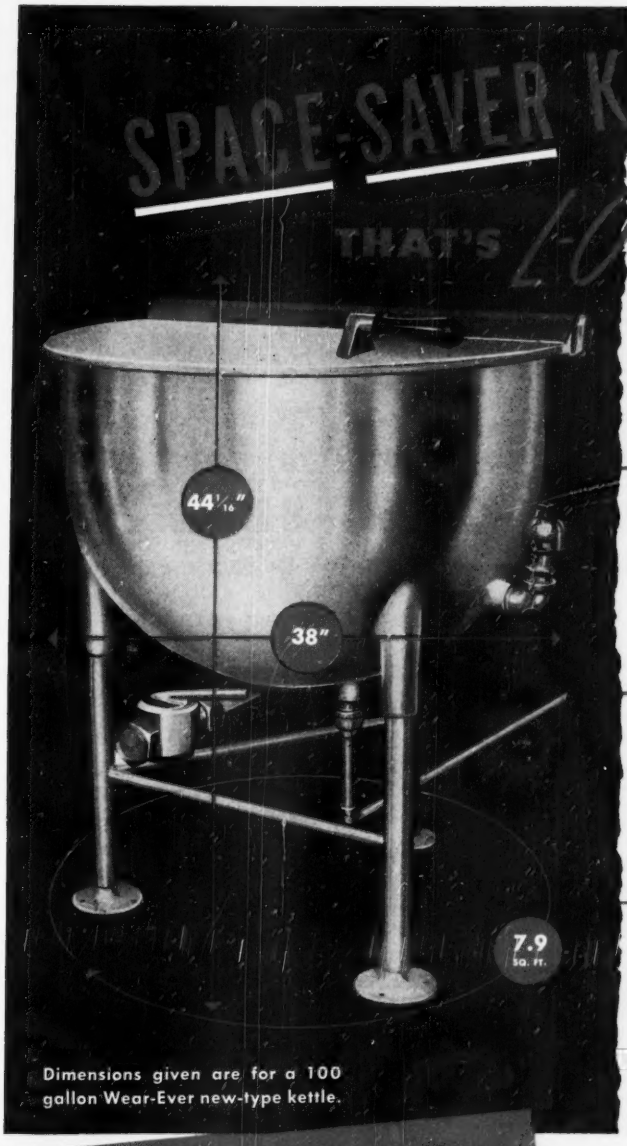
Alva FLAVORS

SPACE-SAVER KETTLE

THAT'S *L-O-N-G* ON HEAT



Dimensions given are for a 100 gallon Wear-Ever new-type kettle.

After a slimming diet in our engineering department Wear-Ever aluminum kettles have emerged with a new, space-saving silhouette.

Solution: Wear-Ever Aluminum conducts heat so well that the jacket doesn't have to be carried to the top of the kettle. This permits deeper construction without any sacrifice of cooking efficiency—*even at the very top.*

Proof: Wet your finger and carefully touch the top of a space-saver Wear-Ever kettle in use. It is H-O-T because aluminum quickly carries the heat *all the way up the sides.*

Made of extra hard alloy, too. Provides strength and durability that can give you thirty years or more of active service. For full details about Wear-Ever Aluminum Steam-Jacketed Kettles mail the coupon today to: The Aluminum Cooking Utensil Company, 304 Wear-Ever Building, New Kensington, Pa.

WEAR-EVER Aluminum

50TH ANNIVERSARY

1900 1950

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The Aluminum Cooking Utensil Company
304 Wear-Ever Bldg., New Kensington, Pa.

Please give us full details about your space-saver steam-jacketed kettles that are long on heat.

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Not One, Not Two, But FIVE Conveniently located Betner Plants

make our food packaging service flexible and economical

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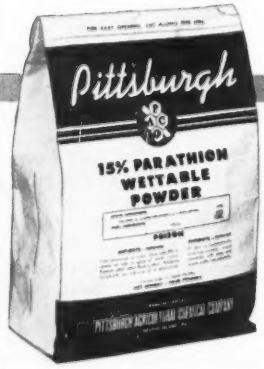
Pinpointed for service to food processors everywhere . . . that's the big idea behind the locating of these Betner Better Bag plants. Where do you have your business? What kind of bag do you need for your product? Betner has it . . . and can get it to you quickly.

Backing up our idea of what a complete bag service should be is a widely-flung sales organization, one or more members of which are near you. Betner Bags are, in effect, as close to you as your classified directory.



NEW! BETNER'S "NO SIFT" BAG
for toxic dry chemicals, powders

If there's any bag that positively *won't* permit dry particles to sift, this is it. Its construction combines special liners with folding, gluing and heat-sealing in such a way that there is virtually "No Sift" for contents.

Betner not only supplies this new bag—now—but special closing machinery for closing it. Your inquiries are welcome. Samples, with full technical information, will be supplied promptly.

LOOK FOR BETNER IN BOOTH NO. 131 at the National Packaging Exposition

Benj C Betner Co DEVON, PA.

CAMP BETNER CORP., Richmond, Va.; BENJ. C. BETNER CO. of WISCONSIN, Appleton, Wisconsin; BENJ. C. BETNER CO., Paris, Texas; BENJ. C. BETNER CO. of CALIFORNIA, Los Angeles, California; SOUTHERN PACKAGING CORPORATION, High Point, N. C.; Affiliate of Benj. C. Betner Co.

A complete bag service—from idea to finished bag to machinery for closing coffee bags and filling and closing liner bags for cartons.

The First and Only

Shaft-Mounted Speed Reducer

Now Has Company

For more than ten years the American Reduction Drive has been the only shaft-mounted speed reducer.

Pioneered, manufactured, and sold exclusively by The American Pulley Company, this unique slow-speed drive is in use on thousands upon thousands of machines in all kinds of industries throughout the world.

In fact, a shaft-mounted speed reducer is such a good idea and has won such an army of enthusiastic supporters that we are not surprised to find other power-transmission manufacturers now launching their own versions of shaft-mounted reducers.

We welcome these newcomers to a field that has been exclusively our own. Their entry demonstrates, better than anything we could say, that the shaft-mounted reducer has "arrived" as the modern, low-cost, slow-speed drive.

For your own slow-speed applications—find out about the drive that is ten years ahead—and backed by far more than fifty thousand successful installations. Exclusive patented features and continuing engineering improvements give you advantages that you can get only with the American Reduction Drive. This compact drive sets the design, appearance and performance standard for all shaft-mounted reducers. Stock units off the shelves of American distributors from coast to coast give you any speed below 154 rpm—easy speed changes—low first cost—quick installation. Send for your free copy of the American Drives Catalog. It shows how the American Reduction Drive works—and how to apply it to your slow-speed equipment.

The American Pulley Company

FIRST in the Field of Shaft-Mounted Speed Reducers

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Sterwin
serves the
ENTIRE FOOD INDUSTRY

Sterwin helps every branch of the Food Industry to provide tastier, more nutritious and more attractive food products for America's housewives.

Leading food processors depend on these tested and proven Sterwin products to insure the purity, uniformity, taste, appearance and nutritional value of their products.

ZIMCO® —Brand of Pure Lignin Vanillin—used by leading flavor suppliers and by the confectionery, ice cream, bakery, soft drink and other branches of the Food Industry.

PARAKEET—Brand of Certified Food Colors —adds eye and sales appeal to all types of food products.

B-E-T-S® —The *Original* Food-Enrichment tablets—add important vitamins and food iron to bread, macaroni and other cereal food products.

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OXYLITE® —A highly efficient and economical flour bleaching agent.

DELTAXIN® —Pure crystalline vitamin D_2 for fortification of milk and other food products.

VITAMIN D_3—Pure crystals for fortification of evaporated milk and other foods.

ASCORBIC ACID (Vitamin C)—Fortifies fruit juices, vegetables, dairy products, beverages and confections. Protects flavor and color of frozen fish and fruit.

TRIDEE® (brand of vitamin D_3) and **RIBOFLAVIN MIXTURE**—Fortify poultry feeds—increase egg production.

SANITIZE YOUR PLANT—with ROCCAL®—The *Original* Quaternary Ammonium Germicide. A powerful germ-killer—can be used for every equipment sanitizing job throughout the Food Industry.

U. S. P. VITAMINS AND AMINO ACIDS IN BULK

There is a Sterwin Technically-Trained Representative in your area. Let him show you how you can put Sterwin products, service and research to work in your plant. Or write direct to Sterwin Chemicals Inc., 170 Varick St., New York 13, N. Y.

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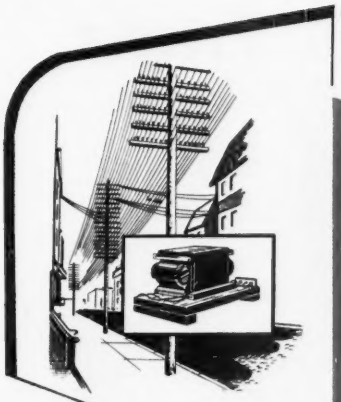
Subsidiary of Sterling Drug Inc.

170 VARICK STREET, NEW YORK 13, N. Y.

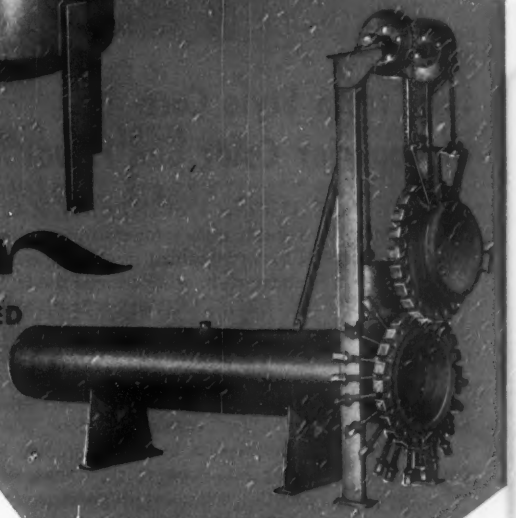
Distributor of the products formerly sold by Special Markets-Industrial division of Winthrop-Stearns Inc., and Vanillin Division of General Drug Company.

BACK IN THE 1880's

WHEN THE ORIGINAL
TRANSFORMER
WAS BUILT



Jacketed mixing tank made of steel.
A. S. M. E. construction.



High pressure autoclave made of steel.
A. S. M. E. construction.

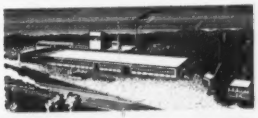
Koven

WAS MAKING INDIVIDUALIZED FOOD EQUIPMENT

For more than sixty years, KOVEN has designed and built individualized food equipment. The skill and craftsmanship gained through these years of experience has won the confidence of leading food manufacturers who turn to KOVEN when they have a specific problem. In our two vast plants are machine, welding, painting and galvanizing shops. X-ray inspection insures quality control. Call or write KOVEN today—no obligation.

KOVEN products in all commercial and non-corrosive metals include: Stainless Steel; Aluminum Sheet Fabrication; Boxes, Tote, Waste Cans; Chemical Apparatus; Coils and Pipe Bands; Copper Sheet Fabrication; Galvanizing Work; Mixers, All Kinds; Monel Metal Fabricators; Pails, Special Heavy; Pans, All Types, All Metals; Sinks, Scullery and Factory; Tables, Galvanized or Monel; Tanks, All Types, All Metals; Kettles, All Types, All Metals.

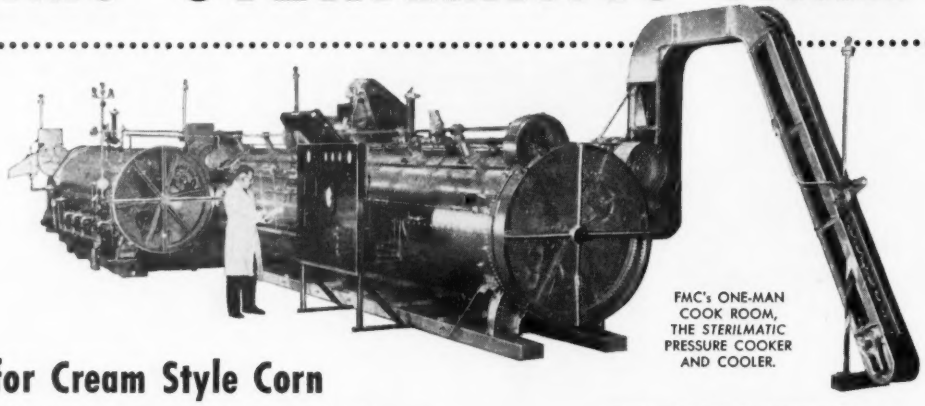
Plants: Jersey City, N. J. Dover N. J.



L. O. KOVEN & BRO., Inc.
154 Ogden Ave., Jersey City 7, N. J.

KOVEN FOR INDIVIDUALIZED FOOD EQUIPMENT SINCE 1881

New Continuous Automatic fmc STERILMATIC Process



FMC's ONE-MAN COOK ROOM, THE *STERILMATIC* PRESSURE COOKER AND COOLER.

for Cream Style Corn of Superior Color and Flavor

The new FMC *STERILMATIC* Process employs a short, high temperature sterilizing principle, essential for outstanding quality in cooking cream style corn, and certain other canned foods. The basis of the *STERILMATIC* Process is the widely used FMC Continuous Pressure Cooker and Cooler, in combination with other necessary equipment. This *"one-man cook room,"* centrally controlled, utilizes automatic protective stops and signals in processing canned products in a fast continuous flow. Rolling agitation of each can results in rapid uniform heat penetration, requiring less cooking time than under other methods. Smooth mechanical progression of cans from cooker elevator to cooler discharge avoids denting and damage. Valuable savings in manpower, steam, water and floor space are effected. In addition, the FMC *STERILMATIC* Process produces cream style corn of superior color and flavor . . . with greater retention of essential vitamins.

An important adjunct to FMC STERILMATIC *equipment is the new FMC Air Blast Can Dryer which quickly and thoroughly dries cans. No reheating is required . . . permitting immediate labeling and casing.*

OTHER EQUIPMENT REQUIRED FOR *STERILMATIC* PROCESSING OF CREAM STYLE CORN

FMC CONSISTOMETER

FMC BLENDING MIXER

FMC BATCH MIXER

DoZURIK AUTOMATIC CONSISTENCY CONTROLLER

NEW (OPTIONAL) FMC AIR BLAST CAN DRYER

WRITE TODAY. *A new booklet fully describing the FMC* STERILMATIC *Process for cream style corn is available on request. Write for full information or contact your nearest FMC representative.*

First in Food Equipment

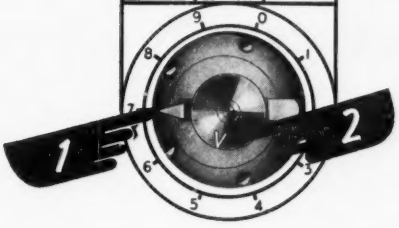
FOOD MACHINERY AND CHEMICAL CORPORATION

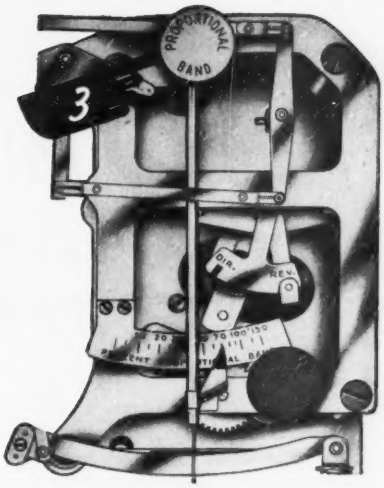
Canning Machinery Divisions

General Sales Offices:

EASTERN: HOOPESTON, ILLINOIS **WESTERN:** SAN JOSE 5, CALIFORNIA

DERIVATIVE TIME	SCALE SETTING	RESET RATE
0	0	0
.1	1	.03
.15	2	.05
.25	3	.08
.40	4	.12
.75	5	.18
1.20	6	.25
2.00	7	.35
3.00	8	.50
5.00	9	.75





if you use . . . or plan to use . . . automatic control instruments

you should investigate

these **THREE EXCLUSIVE ADVANTAGES** you get in

BRISTOL series 500 air-operated controllers

1. Reset Rate . . .
2. Derivative Time . . .
3. Proportional Band . . .

} **ACCURATELY CALIBRATED AND EXACTLY REPRODUCIBLE**

The reset scale is calibrated in actual reset rate. The proportional band scale is graduated in percent of proportional band. The derivative scale is calibrated directly in minutes.

This makes possible the exact duplication of controller adjustments for any process throughout a national organization.

It also makes possible the replacement of controllers on a process with full assurance that such replacements will exactly duplicate the performance of the original—eliminates the cut-and-try method of arriving at the original setting—saves hours by cutting down on shut-down time.

Accurate reproducibility is only one of the many advantages you get in Series 500 Air-Operated Controllers which exemplifies the outstanding instrument engineering Bristol puts into its complete new line of Series 500 recording and controlling instruments—products of over 60 years of instrument experience.

Write for new Bulletin A120 on Series 500 Air-Operated Controllers. THE BRISTOL COMPANY, 115 Bristol Road, Waterbury 20, Conn.

BRISTOL

Engineers process control for better products and profits

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

Mr. Businessman!

WHAT WILL THE 1950 CENSUS DO FOR YOUR BUSINESS?

CONSUMER MARKET INFORMATION

The 1950 Census will provide a huge amount of information about the characteristics of the consumer market. It will tell you what kind of income groups live where . . . what they have and what they need in the way of commodities from automobiles to television sets down to plumbing fixtures. The Census is an accurate survey of economic conditions in your market area. It will not only tell you *where* your customers are, but *what they need that you have to sell them!*

It will show where improved transportation and shipping facilities are needed . . . better harbors and waterways . . . stepped-up Public Service.

That is why the 1950 United States Census is vital to your business!

COOPERATION

You know that the Census-Taker is not just "counting heads." He's actually making a survey of existing conditions in industry, business, employment, housing, education. *You* know census information is as confidential as the vote you cast! Because you know all these things *you'll* cooperate with the Census-Taker in every way when he calls on you.

WHAT ABOUT THE OTHER FELLOW?

But! What about the people who work for you? The man in the shop . . . your own secretary . . . the fellows in the shipping room. Do they know all this about the Census? Chances are some of them do, so the idea is to get the right information across to those who don't!

WHAT'S THE BEST WAY?

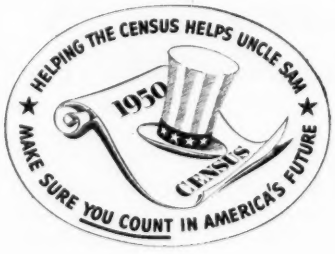
If it's possible, call everyone together and talk about it . . . ask questions . . . exchange ideas. If your outfit is too big for that, direct a Census information memorandum to all your employees. Post information on the bulletin boards. Run a Census story in the company house organ. Talk about it. *Every way you can . . . get the people who work for you to cooperate with the Census.*

WHAT DOES THE 1950 CENSUS MEAN TO YOUR EMPLOYEES?

Better schools . . . school buses . . . school lunches. It means finer roads, bridges and highways . . . increased transportation facilities . . . improved safety regulations. It creates more efficient Public Service and furthers adequate distribution of utility services such as telephones, gas, water and electric power. It will help your community plan better parks, playgrounds, recreation areas and housing. It will mean higher living standards and accurate congressional representation. The Census is *everybody's voice in America's future!*

YOU OWE IT TO YOURSELF . . .

Mister Businessman . . . to your business and your community! Put your efforts behind the 1950 United States Census for an even better country to live in . . . the *best* country to do business in!



Published in the public interest by:

McGRAW-HILL PUBLICATIONS

two good ways to—

BEAT THE HIGH COST OF FLAVORING

PEP-O-ROL®
MM&R
Closely approximates the flavor of
BLACK PEPPER

CARD-O-MAR
MM&R
Closely approximates the flavor of
CARDAMOM OIL

Low-cost blends of pure

Spice Essential Oils...perfected in the laboratories of MM&R!

AS THE MARKET in Black Pepper and Cardamom grows increasingly critical, more and more food processors are turning to MM&R's *natural* replacements — PEP-O-ROL and CARD-O-MAR MM&R. Here are two scientifically perfected oils that can be used *successfully* in place of the spices they duplicate. Yet they cost many times *less!*

Whether you use Black Pepper and Cardamom in crude spice, dry spice or Essential Oil form, you'll be amazed at the ease with which these spices can be replaced in whole or in part by PEP-O-ROL and CARD-O-MAR MM&R.

Write MM&R Technical Service Dept. today for full information.

*contains natural oleoresins as well as pure spice essential oils.

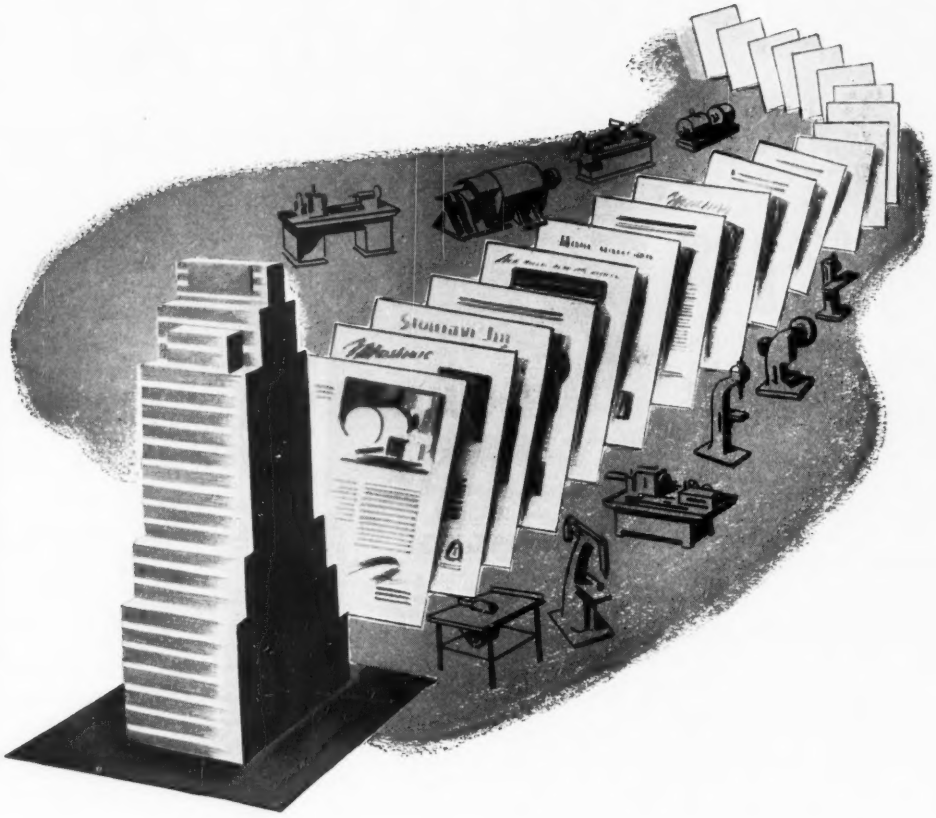
FREE! *An important technical paper — in the form of questions and answers — that will give you a clear and complete picture of the place of Spice Essential Oils in the flavoring of food products. Write for it now!*

13 reasons why **MM&R MAGNATEST SPICE OILS GIVE BETTER RESULTS**

1. more economical.
2. make it possible to flavor your product uniformly.
3. cannot cause discoloration.
4. do NOT mold.
5. release 100% of flavor immediately.
6. prevent introduction of rodent excreta, hair or pellets, insects or insect fragments, etc.
7. always constant in flavor value
8. easy to measure in exact quantities.
9. take up less storage space than crude spices or flavored salt or sugar.
10. decrease freight expense.
11. prevent losses due to exposure during storage.
12. easy to blend.
13. prevent overflavoring of prepared food products during shelf life.

MAGNUS, MABEE & REYNARD, INC.
SINCE 1895 ... ONE OF THE WORLD'S GREATEST SUPPLIERS OF ESSENTIAL OILS
16 DESBROSSES STREET, NEW YORK CITY • 221 NORTH LASALLE STREET, CHICAGO

LOS ANGELES: BRAUN CORP. • SEATTLE, PORTLAND, SPOKANE: VAN WATERS AND ROGERS, INC. • SAN FRANCISCO: BRAUN-KNECHT-HEIMANN CO.



The Parade that has no End

As you go through the pages of this magazine . . . or of any other McGraw-Hill publication . . . a colorful parade of advertising pages unfolds before your eyes.

If you are like thousands of other readers of these magazines, you'll become an avid spectator of this interesting educational show. You'll take in the *whole* of this passing parade.

Why? Because this parade is a non-stop exhibition of all that's new in industry—new developments in products and services, new ways for the buyer to make use of these products, news which can often mean the difference between profit and loss to you.

That's why readers of McGraw-Hill magazines are cover-to-cover readers. That's why they're *regular* readers . . . *serious* readers. That's why men say: FOR THE FACTS OF *INDUSTRIAL* LIFE, TURN TO McGRAW-HILL.

McGRAW-HILL

Publishing Company, Inc., 330 West 42nd Street, New York 18, N. Y.

HEADQUARTERS FOR INDUSTRIAL INFORMATION

Saran film

protects quality... displays goodness!

NEW DRIED FRUIT WRAP

Displays — *glistening transparency reveals appetizing appeal of dried fruit.*

Protects — *toughness of saran film keeps package neat and appealing regardless of customer handling.*

Flavor — *constant moisture level within package retains tempting natural flavor.*

Ageing characteristics — *Saran film remains soft and appealing to the touch under normal conditions.*

Gas impermeability — *keeps undesirable odors and flavors from the dried fruit.*

Here's dried fruit packaging that leads the way to profitable sales. Saran film's impermeability maintains a constant level of moisture in the package . . . keeping dried fruit tender and flavorful. The eye-appealing transparency of saran film gives added impetus to impulse sales by showing the tempting goodness of dried fruit.

Be sure to ask your supplier for dried fruit packaged in saran film . . . and ring up new sales!

use *Saran film* *to package candy in moisture-proof bags*

The Dow Chemical Company
Plastics Division Dept.—TOF-20
Midland, Michigan

Please send me additional information about saran film packaging.

Name _____

Company _____

Street _____

City _____ State _____

DOW plastics

Plastics Division Dept.—TOF-20—*Packaging Section* • **THE DOW CHEMICAL COMPANY** • **MIDLAND, MICHIGAN**

New York • Boston • Philadelphia • Washington • Atlanta • Cleveland • Detroit • Chicago • St. Louis • Houston • San Francisco • Los Angeles • Seattle • Dow Chemical of Canada, Limited, Toronto, Canada

TO MAKERS OF FOOD PRODUCTS

Your Folding Cartons are Produced by

THE MOST MODERN MACHINERY AND METHODS KNOWN TO PACKAGING ART

when You Specify

FOLDING CARTONS

by Ritchie

Ritchie's entrance into the manufacture of Folding Cartons means—that you now get the benefit of the Newest, Most Modernly-Equipped Folding Carton Plant in the Industry; the Direct Savings resulting from the latest cost-cutting, efficiency methods... the High Precision possible only with the most advanced equipment... the Finest Construction on the most improved machines... and Dependable Delivery due to these complete, new production facilities.

All these Folding Carton advantages are yours at Ritchie's, PLUS our 84 years of experience and technical skill in planning, designing and producing packaging for the makers of America's finest products.

To Introduce

Ritchie's New Folding Carton Division

We Offer You FREE PACKAGING EVALUATION

We have retained the services of Dave Chapman, famous designer and packaging consultant, to render his critical opinion of your packages on such important factors as Eye Appeal, Product Protection, Sales-Creating Value and other essential elements; all without any cost or obligation to you.

Learn how you can get the benefit of this Free, Expert Evaluation for your packages. Fill out and send in the coupon below, or call your nearest Ritchie Representative.

New Brochure Tells "How, What, When, Where, Why" of Better Packaging

This helpful reference booklet is yours Free of Charge, simply by requesting it on the coupon below.

FREE APPRAISAL ☐ Without cost or obligation, please have a Ritchie Representative call on me with full details of your Free Packaging Appraisal Offer.

☐ **FREE BROCHURE** I would like to receive a copy of your brochure "101 Ways to Get Better Packaging" and am interested in getting quotations on ☐ Set-Up Boxes ☐ Fibre Cans ☐ Transparent Boxes ☐ Folding Cartons. Please have a Ritchie Representative call on me.

W. C. Ritchie and Company,
8870 Baltimore Avenue, Chicago 17, Illinois

SIGNED _____ TITLE _____

COMPANY NAME _____

STREET ADDRESS _____

CITY _____ STATE _____

W. C. Ritchie AND COMPANY
A Source of "Packaging-Satisfaction" Since 1866

8870 BALTIMORE AVENUE, CHICAGO, ILLINOIS

New York Los Angeles Detroit Providence
Denver St. Louis Cleveland Jacksonville Dallas

Whether you haul food or fixtures . . .

NEW INTERNATIONAL TRUCKS

ARE *Heavy-Duty Engineered* TO SAVE YOU MONEY

Heavy-duty engineering for long truck life on tough truck jobs is yours now in every single new International Truck from 4,200 to 90,000 pounds GVW.

That's the same extra value engineering that has kept Internationals first in the sale of heavy-duty trucks for 18 straight years.

Cost-conscious, profit-minded heavy-duty truck users have preferred Internationals year after year for only one reason: heavy-duty engineering means that International Truck performance is longer life performance, lower operating and maintenance cost performance.

And now the same management, engineers, test experts, and production men who kept Internationals a tradition in the heavy-duty truck field have developed *every new International Truck*. No matter what size truck you use, there's a heavy-duty engineered International Truck that's right and ready for you!

You'll find new comfort in the new Comfo-Vision Cab

Model for model, here is "the roomiest cab on the road." It gives you new comfort in easy-riding cushions, adjustable seats, controlled ventilation. It gives you full front visibility through a one-piece, scientifically curved Sweepsight windshield.

And comfort is right at your fingertips when you take the sturdy wheel. The entire steering system is engineered for more positive control from a more comfortable position.

You'll get an all-new truck proved under actual operating conditions

"Proved under actual operating conditions" takes in years of time, millions of dollars, countless miles. But these new Internationals took in all those and then some—to give you proved-in-advance performance.

No matter what kinds of roads or loads, climate or conditions your trucks must meet, there's a new International that has been *proved* right for your requirements.

Find out all about that truck from your nearest International Truck Dealer or Branch, *soon*.

International Harvester Builds
McCormick Farm Equipment and Farmall Tractors
Motor Trucks . . . Industrial Power
Refrigerators and Freezers

Tune in James Melton and "Harvest of Stars"
NBC, Sunday afternoons

ALL NEW, ALL PROVED

INTERNATIONAL TRUCKS

INTERNATIONAL HARVESTER COMPANY CHICAGO

was this call necessary?

Some "Moral Insurance" here might have avoided a serious accident

Workmen's compensation is a fine thing—but it can't replace a mangled arm.

Safety laws prevent many accidents—but they can't cover every hazard of an individual plant.

Accident prevention which goes *beyond the law* is an unwritten responsibility of every employer. It is his "Moral Insurance" for his employees welfare.

The premiums for "Moral Insurance" are not high. They do not have to be paid for in fancy safety gadgets. Their cost is simply the institution of common sense safety regulations covering all local hazards—enforced by employee committees with the full support of management.

Yes—"plant safety" is a mutual job.

DON'T FORGET—THE LIFE YOU SAVE MAY BE YOUR OWN

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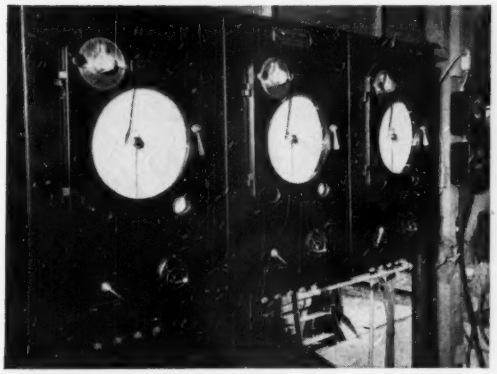
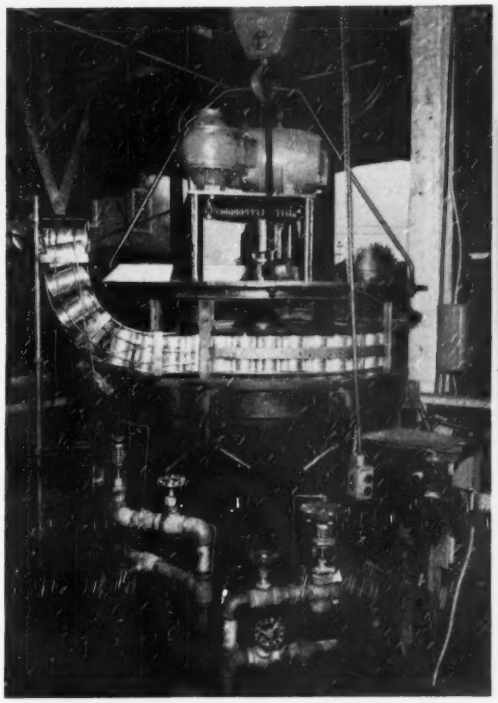
Teamed for Top Efficiency

BOTT RETORT LOADER—UNLOADER

and

TAYLOR AUTOMATIC RETORT CONTROL





BERLIN CHAPMAN retorts equipped with their new cost-cutting Bott Retort Loader-Unloader now come standard equipped with Taylor Automatic Control. Field tests by Berlin Chapman have proven that the new Taylor-controlled unit "will cut your production costs and produce a better product because of closer control of cooking and cooling."

From the closing machine, the cans travel directly to the retort, where they're automatically placed on rotating perforated discs inside the retort. Once the discs are loaded and the retort is closed, Taylor Fulscope* Controllers with Process Timers like those above, take over the critical temperature and time control of processing. All the operator has to do is close the retort and push a start button.

There are three good reasons why Berlin Chapman and many other equipment manufacturers standardize on Taylor Instrumentation:

1. **Precision Instruments**
2. **Processing Know-How**
3. **Quick Service From Experienced Field Engineers When It's Needed**

These are also good reasons why canners from coast to coast specify "Taylor Equipped, As Usual", when ordering new or modernizing present processing equipment. Ask your Taylor Field Engineer for complete details on controls for Retorts, Blanchers, Juice Heaters, Lye Peelers, Exhausters, Continuous Cookers, Cooling Canals, Deaerators, Jam and Jelly Kettles, etc. Write for Catalog 500! Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.

* Reg. Trade-Mark

• • •

Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.

TAYLOR INSTRUMENTS MEAN ACCURACY FIRST

For Your Feeding Classifying Conveying Problems!

SYNTRON

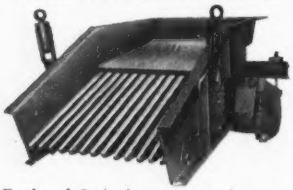
Suggests—

VIBRATORY FEEDERS

—with capacities of up to Hundreds of Tons per hour of various materials—hot or cold—dry or damp—from fine powders to big abrasive lumps.

—at instantly controllable rates—just turning a rheostat or reactor dial gives a range of feed, from a trickling dribble to a gushing torrent.

VIBRATING GRIZZLIES



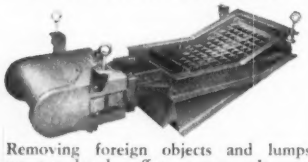
Feed and Scalp in one operation.

Increase crushing capacity and efficiency.

Bypass fines—oversize to crusher.

No motors, gears, pulleys, etc. to maintain.

VIBRATING SCREENS



Removing foreign objects and lumps from powdered coffee, sugar, salt, etc. Dewatering chopped and dice vegetables, classifying peas, beans, nuts, etc.

Write for illustrated literature

SYNTRON CO.

460 Lexington **Homer City, Pa.**

"WELL---
WHADDA YA KNOW!"

No—this man hasn't discovered who murdered the butler and stuffed his body in the bath-tub.

He's reading an advertisement in THIS magazine! He has his eye on a product that promises the answer to a brand new problem he's been sweating over.

Exaggerated? Not a bit! For the advertising pages of every McGraw-Hill publication are replete with ideas, products, services designed for the men who are responsible for design, production, maintenance, marketing—every specific operational phase of modern business and industry.

Month after month America's leading manufacturers are parading their newest and best wares before your eyes in THIS McGraw-Hill magazine. You're the judge and jury as to whether they can *solve a problem—offer a short-cut—show a profit*—for you.

To keep in touch with the parade------

READ THE ADS.

Ice Plant Operation

speeded by JAMISON DOORS

(as seen at the Southern New England Ice Co.)

DOOR CLOSER SAVES TIME AND REFRIGERATION

Ice can be moved out on the delivery dock faster when the door closes automatically. Refrigeration is saved, too, because the Jamison Door Closer never forgets to close the door so that the full benefit of Jamison Door insulation is obtained.

VERTICAL SLIDING DOOR SIMPLIFIES ICE CUBE HANDLING

Bags of ice cubes are handled rapidly by the roller conveyor and a Jamison vertical sliding door in the wall. For detailed information on these and other Jamison Cold Storage Doors, request Catalog 175.

JAMISON

HAGERSTOWN, MARYLAND, U. S. A.

The oldest and largest builder of cold storage doors in the world

JAMISON COLD STORAGE DOOR CO. • HAGERSTOWN, MD., U.S.A.

THRIFTY PROTECTION for HARD-TO-PACK PRODUCTS

Bemis WATERPROOF Laminated Textile Bags

The Strongest Shipping Bags Made

They are ideal for products needing special protection against contamination, sifting, or loss or absorption of odors or moisture. Bemis Waterproof Bags are resistant to oil, acid, tears, punctures and insect infestation. They're economical, too. Investigate.

BEMIS BRO. BAG CO.
WATERPROOF DEPARTMENT
408-C Pine Street • St. Louis 2, Mo.

MAIL THIS COUPON NOW!

BEMIS BRO. BAG CO., Waterproof Dept. 408-C Pine Street, St. Louis 2, Mo.

Send information about Bemis Waterproof Bags for

_____ (PRODUCT)

Name_____

Company_____

Street_____

City_____ Zone_____ State_____

"THAT'S FOR ME!!!"

That's just exactly what the man said.

You've probably said it, too—as you leafed through the advertising pages of a current issue of THIS magazine.

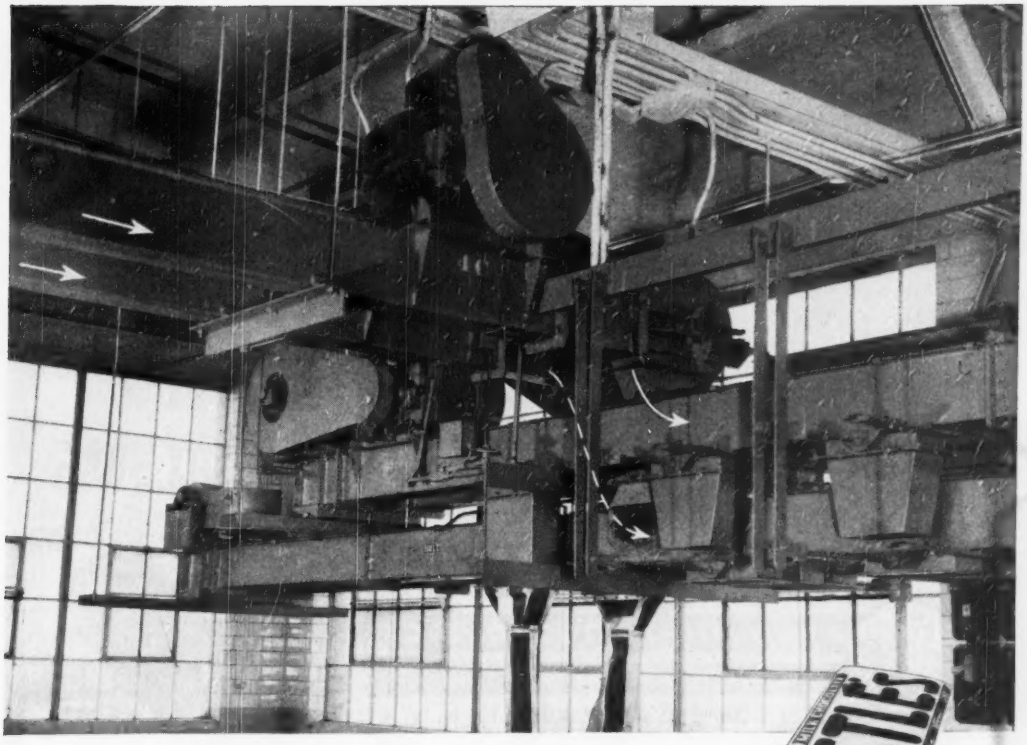
It happens all the time—to every man who is on top of his job.

Why? Because he keeps a weather eye out for the things that promise a better, faster, more economical way of doing something.

He knows that America' 'eading manufacturers take the newest and best of their products and services to market in the advertising pages of the business and industrial magazines that help him keep on top of his job. And if *it's for him* he wants to know what makes it tick.

To keep in touch with the parade------

READ THE ADS.



Hustles Nibs for Nestles

Lower handling costs, faster operation, reduced maintenance costs all resulted with the installation of this S-A-designed REDLER handling system for cocoa nibs. Enclosed REDLER Conveyors prevent spillage, keep product clean and keep it moving at a fast, low-cost-per-ton rate.

For almost half a century, S-A engineers have been designing and installing bulk materials handling systems in almost every classification of the food industry. S-A's complete line of conveying equipment coupled with the "know-how" of S-A engineers for applying the latest engineering principles always results in fast, efficient conveying . . . in systems that move the most tonnage at lowest cost per ton.

Let S-A engineers submit their recommendations for an efficient, economical method of handling your products. Write today.

PETER CAILLER KOHLER
SWISS CHOCOLATE CO., INC.
FULTON, NEW YORK

Cocoa nibs from crackers and fanners are fed into a dual REDLER conveyor-elevator system that moves nibs to floor above. There, it feeds into two 135 ft. long REDLER horizontal closed circuit conveyors suspended over long rows of storage bins. 148 lever controlled gates permit discharge of cocoa nibs into any or all bins. If bins are full, cocoa can be recirculated until needed. Compact REDLER design permitted installation without major alterations. Capacity . . . 2500 lbs. per hour at rate of 18 ft. per minute.

STEPHEN S-A DAMSON
MFG. CO.

6 Ridgeway Avenue, Aurora, Illinois — Los Angeles, Calif. • Belleville, Ontario

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Imprinting Flavors and Code-Dates on Ice Cream Containers
Another SUCCESSFUL APPLICATION of the ROLACODER* Marking Machine
#4 IN A SERIES

Ice cream plants everywhere use ROLACODERS to imprint code-dates, flavors and other variable information on their packages—from 1-pint cartons to 5-gal. drums. ROLACODERS work *automatically* in conveying and packaging operations—eliminate need for manual rubber-stamping and stencilling labor. Models to imprint top or side. *Write for Data Sheet 6.0.*

* Pat. Pending

See the ROLACODER in action at Booths 123—125 NATL. PACKAGING EXPOSITION Chicago—Apr. 24-27

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ADOLPH GOTTSCHO, INC.

MACHINES TO MARK WHATEVER YOU MAKE

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(Patent Applied For)

Bring You A New High in Quick, Quality Freezing. Economical, Flexible, Uniform Packs.

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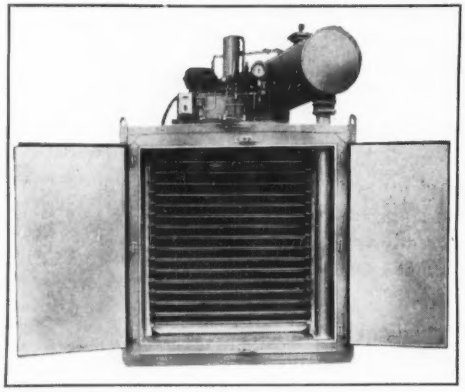
Vege-tables

Juices



Meats

Poultry

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Model B 15 Stations

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UNION CITY NEW JERSEY

"It's the Contacts that Count"

MONARCH NOZZLES SOLVE YOUR SPRAY PROBLEMS

In many Food Processing plants Monarch Spray Nozzles are used to . . . .

Wax Fruits
Rinse Vegetables
Powder Milk
Dry Eggs
Wash Filter Cake
Humidify
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Remember

if the liquid can be sprayed with direct pressure Monarch can furnish the Nozzles.

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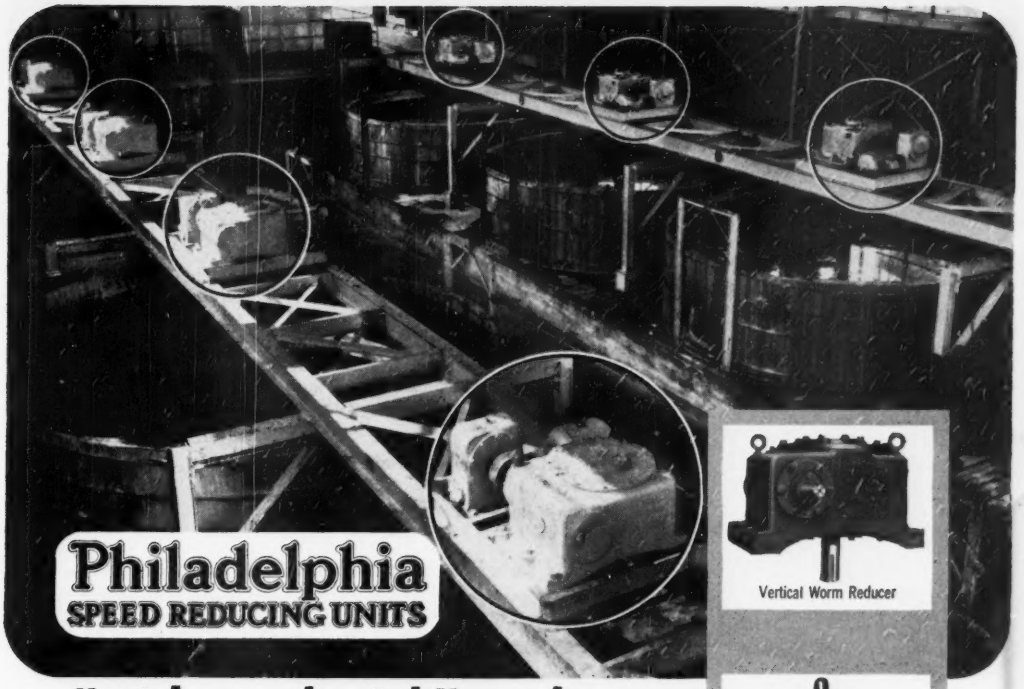

Vertical Worm Reducer

Worm Reducer

--"stick on the job"... day and night, at this Glue Plant

These 16 Philadelphia Worm Gear Speed Reducers, Types A. T. and V. T. connected together, are in continuous use at the well known glue manufacturing firm of Delany and Co., Inc., Philadelphia, Pa. The units are mounted over huge mixing vats, and the shafts of the Vertical Drive Reducers extend down into the vats and revolve very slowly. The two types of Philadelphia Worm Reducers are shown in more detail at the right.

Thousands of Philadelphia Worm Gear Reducers of all types are used throughout the world, for most every conceivable purpose in: Paper and Pulp Mills; Chemical and Process Plants; Food Plants; Steel Plants; Metal Working Industries; Sugar Refineries; Power Plants and on Shipboard.

Send for copy of the Worm Reducer Catalog #26, and please use your Business Letterhead when requesting it.

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Industrial Gears and Speed Reducers
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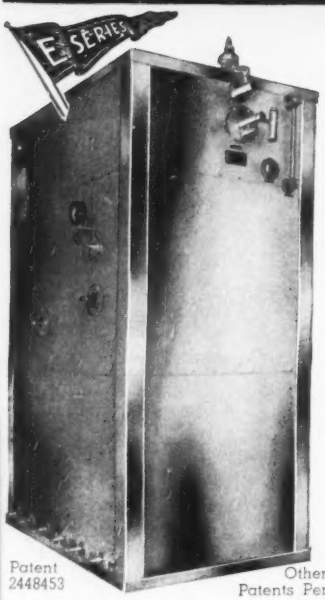
Will 33° Ice Water solve your problem?



Patent 2448453 Other Patents Pending

"King Zeero" ICE BUILDER

The New Standard in Sweet Water Cooling

"KING ZEERO" ICE BUILDERS and CABINETS are unexcelled for use for quick cooling of products.

This new standard of sweet water cooling has been set by KING ZEERO Company's leadership in research and original construction.

A "KING ZEERO" installation places tons of ice at your disposal without handling. Ice is formed on the coils with a comparatively small compressor and motor, and melted by the recirculated water used for cooling the product. 32° to 33° ice water is assured.

The refrigeration is stored in the form of ice during off load periods.

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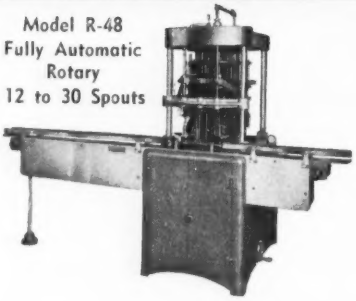
Simple design for low cost maintenance!
Precision engineered for high efficiency!

Model R-48
Fully Automatic
Rotary
12 to 30 Spouts



- For all types of foamy and still liquids.
- Variable speed drive.
- Automatic overflow (no waste.)
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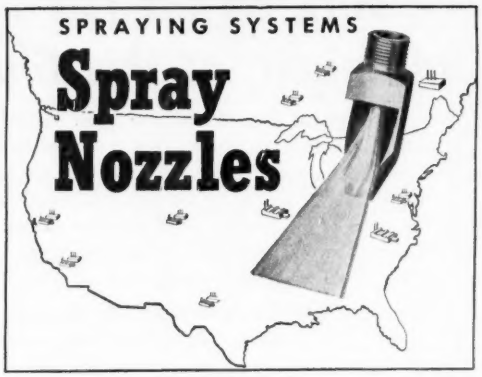
Spray Nozzles



used everywhere in industry for BETTER SPRAYING at LOWER COST . . .

Spraying Systems Co. engineered spray nozzles are cutting production costs everywhere in industry . . . by providing better spray nozzle performance and resultant better processing or equipment operation. Get the facts today by writing for General Catalog 22, or Pneumatic Atomizing Catalog 23.

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Batting Average .241

The .350 hitter, of course. He's the "money-player" because of a lot of important *plus* factors . . . a keener eye, better timing, a perfect stance, big-league experience. The same is true in package boilers, too. The Preferred Unit Steam Generator has an important edge because it offers a host of *cost-saving design extras.*

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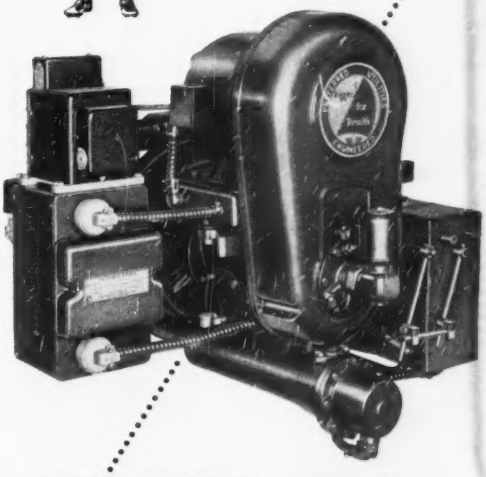
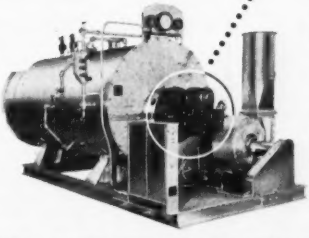
Want to know more about what makes the Preferred Unit a star performer? Send for Bulletin 1000 giving all the facts.



7 "WORTH-MORE" FEATURES OF THE PREFERRED UNIT



- 4-pass, high velocity, gas travel — minimizes tube cleaning maintenance by self-cleaning action.
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- Special *precipitator* developed by Preferred as aid to safe and clean operation.
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PR 184

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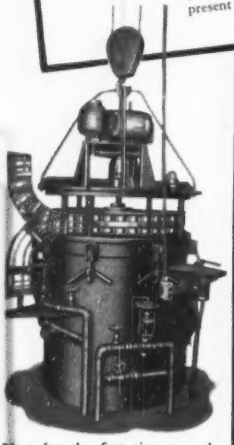
PROCESSING MACHINERY for all Food PRODUCTS

Into the designing and engineering of Berlin Chapman Food Processing Machinery are reflected the years of experience of our engineering staff, personnel, and facilities to produce equipment to meet our customers' present day operating conditions.



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Retorts
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Hoists

High Speed Juice Equipment
Juice extractors
Juice tanks
Coils
Exhaust boxes

Tomato Processing Machinery
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Soak tanks
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Roller inspection tables
Peeling tables
Screw type extractors
Heating tanks and coils
Tubular heaters
And special machinery necessary for tomato processing

Corn Processing Equipment
Corn silkers (high speed)
Corn mixers
Double batch corn mixers
And other equipment necessary for corn processing

Pea Processing Equipment
Washers
Blanchers
Picking tables
Separators
Graders
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Elevators
And all equipment necessary for pea processing

Now for the first time a real, mechanized cook room. The new Berlin Chapman BOTT Retort Loader-Unloader will save:

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- Cooking time
- Cooling time
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- Can storage space
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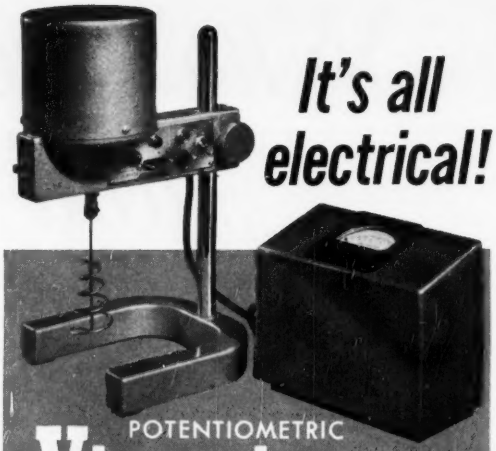
BERLIN CHAPMAN CO
Berlin, Wisconsin

Berlin Chapman SINCE 1909
Processing Machinery FOR ALL FOOD PRODUCTS



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Viscosimeter

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- Designed especially for thixotropic gel or polymerizing substances
- For complete information write for Brochure M-4

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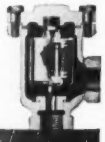
—and no waiting! But in your plant there may be slow-ups and other production headaches because a single large steam trap is supposed to drain a whole battery of machines or a number of individual coils or jackets.

Use individual trapping—a separate trap on each unit and make sure that condensate is not held back to slow up your operation.

THE SELECTION of the right steam trap is not difficult. Sarco Selection Chart No. 1600 shows first and second preference for standard applications, or the Sarco man will study and recommend for every process in your plant.



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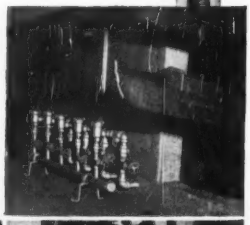

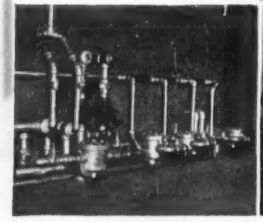

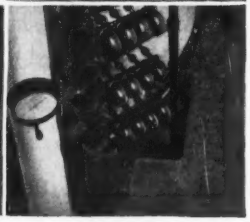

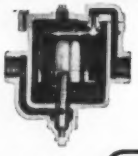

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SAVES STEAM
IMPROVES PRODUCT QUALITY AND OUTPUT

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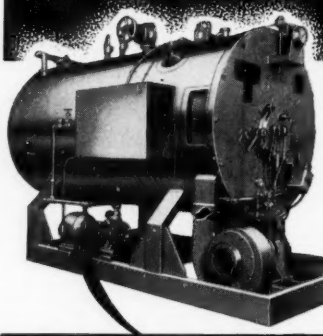

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AMESTEAM GENERATOR design provides a better automatic Unit—soundly engineered to meet your needs.

All internal and external parts and auxiliaries are completely accessible. Front and rear flue covers, burner head and one-piece rear baffle are mounted on davit-type hinges, Sizes A-50 and larger. It is unnecessary to dismantle the entire front end to gain access to front tube sheet—and front need not be opened to clean tubes and furnace.

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(Creator of the famous "Flying Red Horse")

"A first look can sell a product but the FIRST TASTE MAY KILL IT"

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Says
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Proper packaging protects PROFITS as well as PRODUCTS"

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The men who create sales-winning packages know that product protection must be built into the package *first*. Eye-appeal makes impulse sales, but repeat sales depend upon whether your product pleases the consumer.

Check the sales leaders in field after field and you will find well-designed packages . . . and over and over again, you will find a Riegel paper inside for product protection. Many other Riegel papers are designed for flexible packages, for laminates, for outer wraps and for almost every requirement in protective packaging.

Tell us your needs, and we believe we can offer you a paper that will do *your* job . . . efficiently and economically.

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DR. LUCIUS W. ELDER
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"Good packaging starts with ENGINEERING" *Says*
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"PROTECTION is the CORNERSTONE of Packaging"

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"A GOOD Package Design is MORE than art-work"

Says EGMONT ARENS
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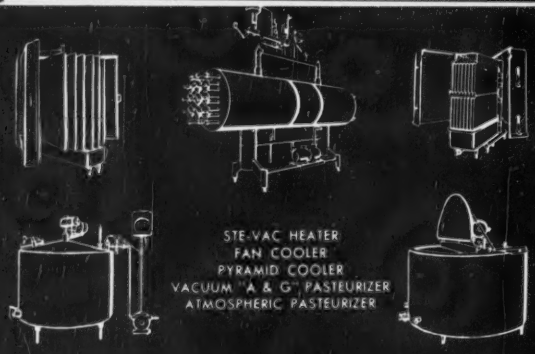

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VACUUM PROCESS VATS

for HEATING • COOKING • COOLING
... UNDER VACUUM

The Chester-Jensen Vacuum Batch Pasteurizer

★ Off-flavors, volatile odors, and air are removed while heating, holding and cooking.

★ Heating or cooling water circulates at high velocity thru the spiral water jacket producing heat transfer throughout the entire side wall and bottom area.

★ Correct agitation to insure complete mixing at low speed.

Full specifications and bulletins gladly furnished on request.

Chester-Jensen Vacuum Batch Pasteurizer

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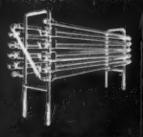

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The joining of these two organizations creates a fund of DRYER KNOWLEDGE unequalled anywhere. To STANDARD'S already fine dryer organization are added the engineering data and key personnel of HERSEY. The results:

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- **FACILITIES** to test materials—to try new designs—to manufacture all type of dryers EFFICIENTLY.
- **TALENT** to investigate, to advise, to ANSWER your dryer problems.
- **SERVICE** representatives throughout the world.

Write **TODAY** *for the new* **STANDARD-HERSEY** *bulletin,* describing our Continuous and Batch DRYERS, Rotary COOLERS, KILNS, and CALCINERS for the Process Industries.

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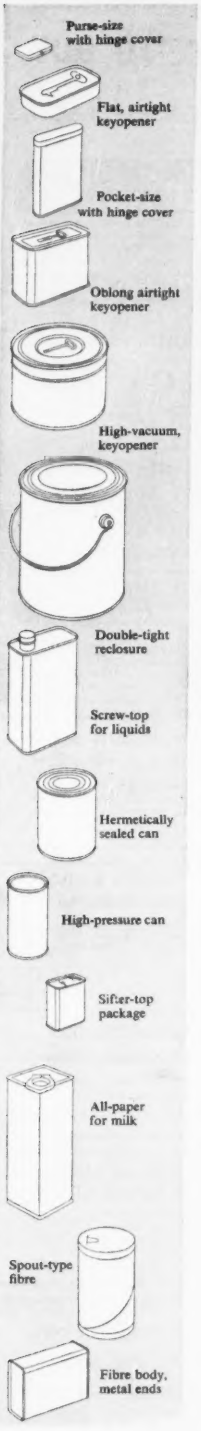
WHICH PACKAGE SUITS YOUR PRODUCT?



Narrow-slotted key fits easily over tongue and controls removal of strip. Key's electric-welded to protect against loss. *Cover* fits snugly over collar for positive reclosure.

To meet requirements of product packed, can may be enameled with suitable lining. If for vacuum use, can construction withstands maximum vacuum. Lithography in as many colors as desired in any design.

If reclosure is important to your product—

Take a good look at the container pictured above. Maybe it offers you a new approach to greater sales. Some of its advantages are:

1. **It opens easily and recloses securely.**
2. **It protects your product from air.**
3. **Its shape permits a big eye-catching label.**
4. **Its wide mouth opening allows easy access with large measuring devices.**

IS IT YOUR ANSWER?

This container was invented by Canco for use in vacuum-packing coffee. Its use, however, was extended for vacuum-packing (or gas packing) dry milk, tobacco, peanuts, and other nuts, hard candy, nut brittle and shortening.

It is also used *without vacuum treatment* for chocolates, cookies, fruitcakes, miscellaneous confections and even surgical bandages.

Your packaging problem may be similar. If it is, why don't we talk over the special details together?

Since 1901, Canco has been creating new and more effective packages. There is hardly a major development in the packaging field that this keen organization has not pioneered.

We can advise you on how to build sales, cut costs, improve processes, and on filling and closing procedures. We stand ready to serve you promptly in production-line emergencies. *Call Canco First!*

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Equipment for the Processing Industries

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SANITARY AND BRINE PUMPS

SANITARY

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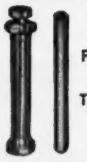

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TUBING

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Sanitary Equipment for the Processing Industries

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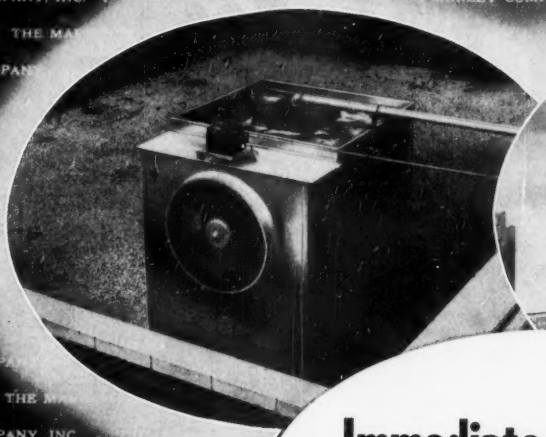

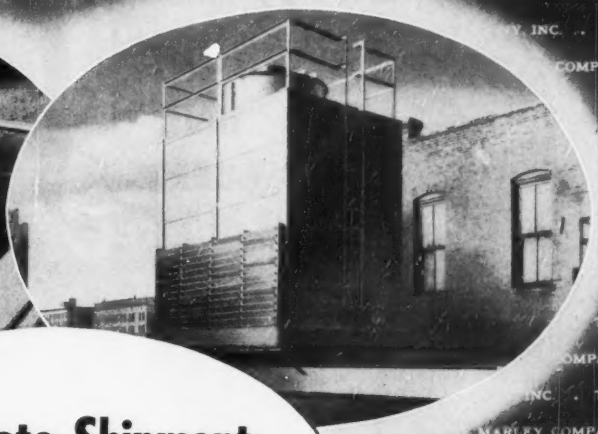

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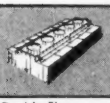

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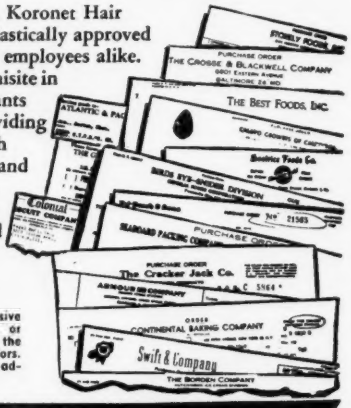

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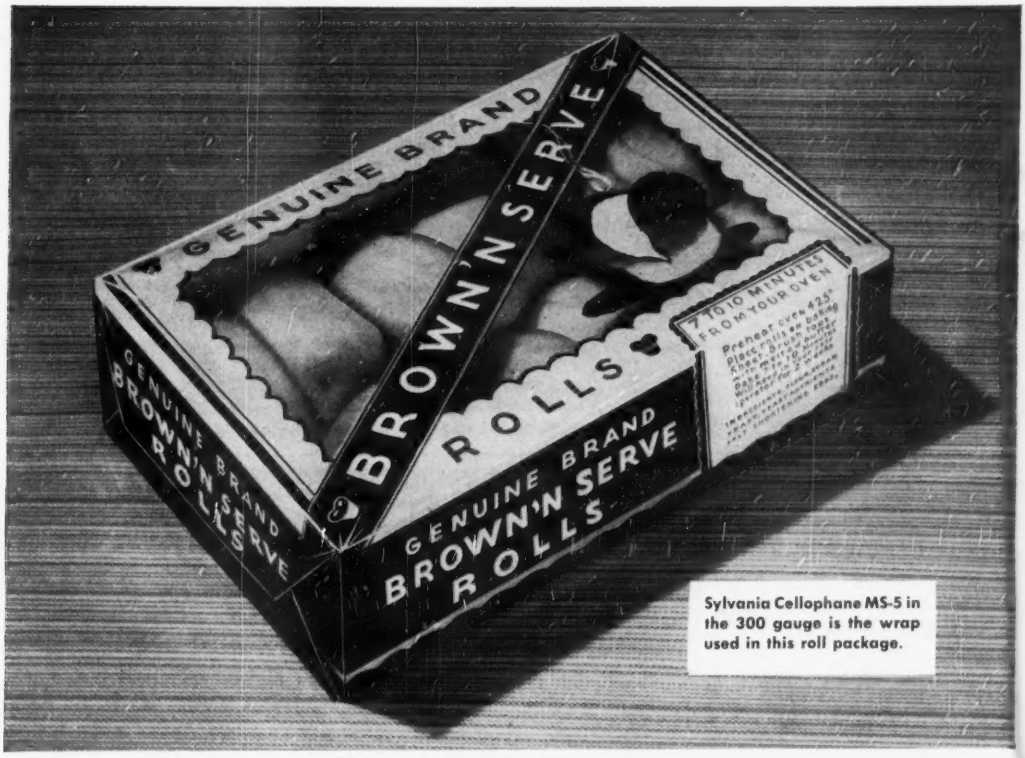

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Specific qualities engineered for your product tell why:

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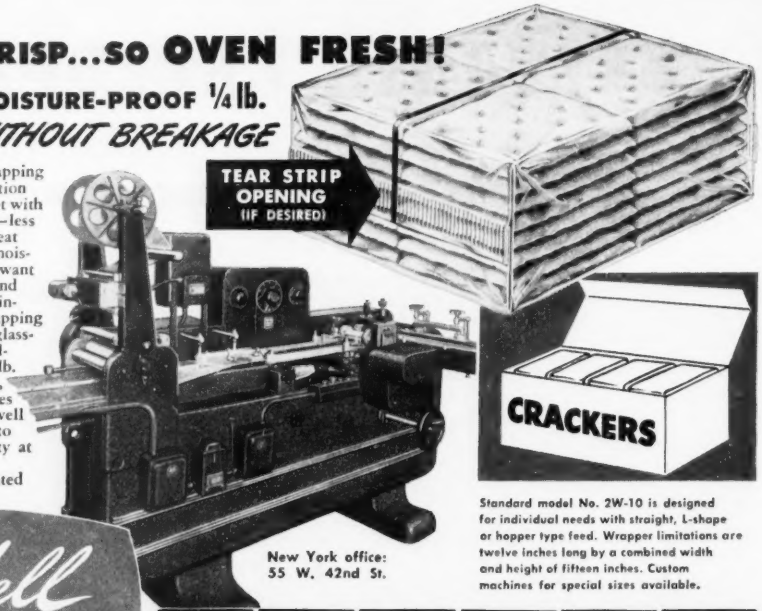

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(Continued on the opposite page)

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Reduced for Quick Sales

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Pneumatic Scale Automatic Duplex Straightline Labeler, 120 per min., front & back labels. Flasks and Quarts.

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Ertel 12-head S. A. Vacuum Filler.

Horix Stainless Steel Rotary Filler.

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Standard Knapp No. 429 Carton Sealer, 10 ft. Compression Units.

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PW-2357, Food Industries
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(Continued from the opposite page)

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POSITIONS WANTED

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8—Day Powder Mixers, up to 2,000#.
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2982/1	CR Pre-Heater or Pasteurizer V35 Brierly Double Head Citrus Chipper or Slicer
1932/D2	CR Bean Snipper Model CE76L
2501/N2	A.T.&M. Monel Centrifugal Extractor; under driven
2184	2 Berlin Chapman Filler-Syrupers; 7 valve and 11 valve
2986	2 M.&S. 6 Pocket Fillers for No. 2
2986/K14	High Speed 12 Pocket M.&S. Filler; non-corrosive contact parts
2184/B43	Six Filler Machine Co. Piston Fillers; four to 11 pistons
2982/F9	Holm Automatic Weigher-Filler up to 100 lb.
2965/B2	Rietz Stainless Disintegrator; 50 H.P.
2700/C2	Karl Kiefer Stainless 16 Spout Rotary Vacuum Filler
2919/J5	Screw Type Dewatering Press 10" x 50"
2872/P2	Mt. Gilead Hyd. Press 24" x 24" with pump
2819/M	5 Berlin Chapman Retorts 42" x 54" with Taylor instruments and controls
2849/F1	Four Basket Hor. Retort: 40" x 18'
2934/W1	Burt Model E Case Packer for No. 2
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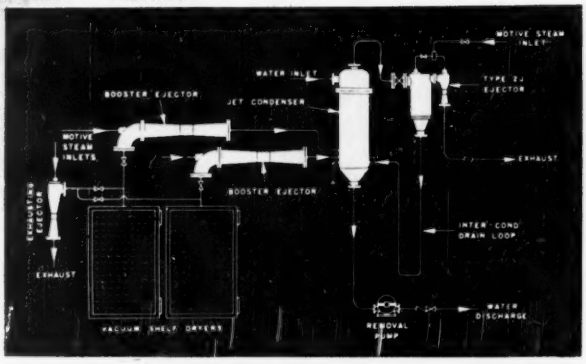

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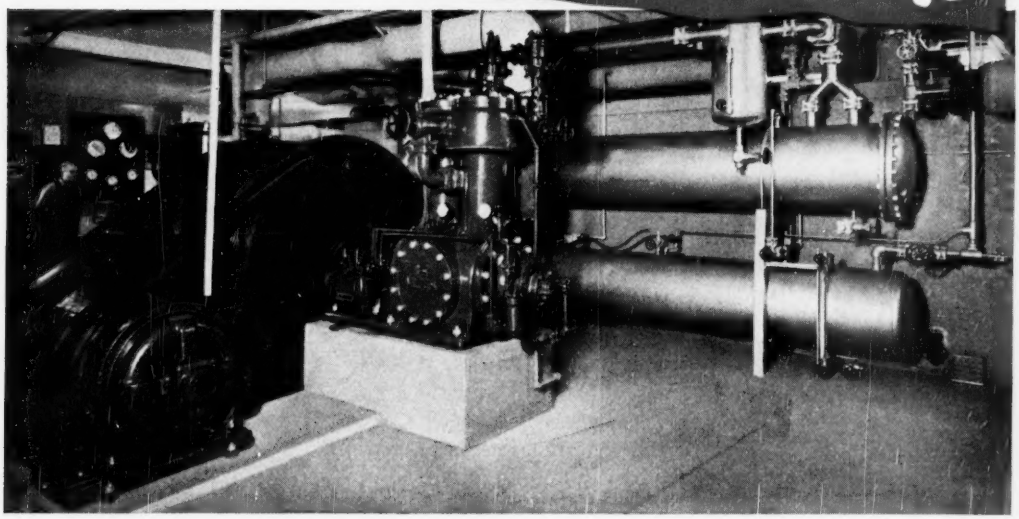

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